THE CITY OF NEW YORK

BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL

New York Bay Section—Trench Method

CONTRACT No. 4A

Contract Drawings
1 to 58

1925

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THE CITY OF NEW YORK

BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL

New York Bay Section—Trench Method

CONTRACT No. 4A

Contract Drawings

1 to 58

1925

21 O-5000-25-33

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Tunnel Engineer.

LIST OF CONTRACT DRAWINGS

CONTRACT NO. 4A.

Dwg. No.

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2. Detail Plan and Profile, Station 110+92 to Station 136.
3. Detail Plan and Profile, Station 136 to Station 166.
4. Detail Plan and Profile, Station 166 to Station 196.
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14. Grillage, or Landing Platform, Trench Portion, Alternative Plans 1 and 2.
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Dwg.
No.

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34. Special Tunnel Construction near South Street Shaft, Section EE, Station 214+68.
35. Special Tunnel Construction near South Street Shaft, Section FF, Station 214+74.
36. Special Tunnel Construction near South Street Shaft, Special High Tension Splicing Chambers 1 and 4.
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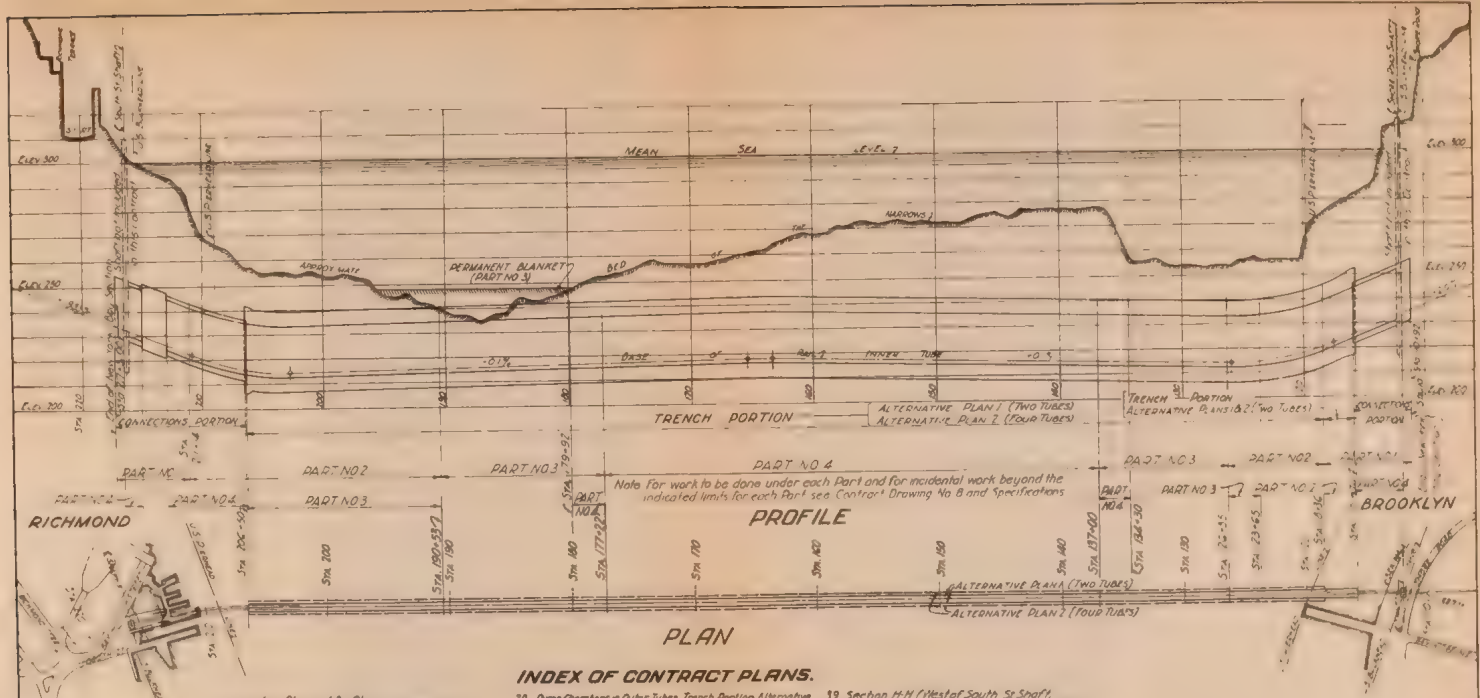

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57 Areas Available for Contractors use Brooklyn
58 Areas Available for Contractors use in Richmond

Approved
Chief Engineer
Chairman
Board of Estimate and Apportionment

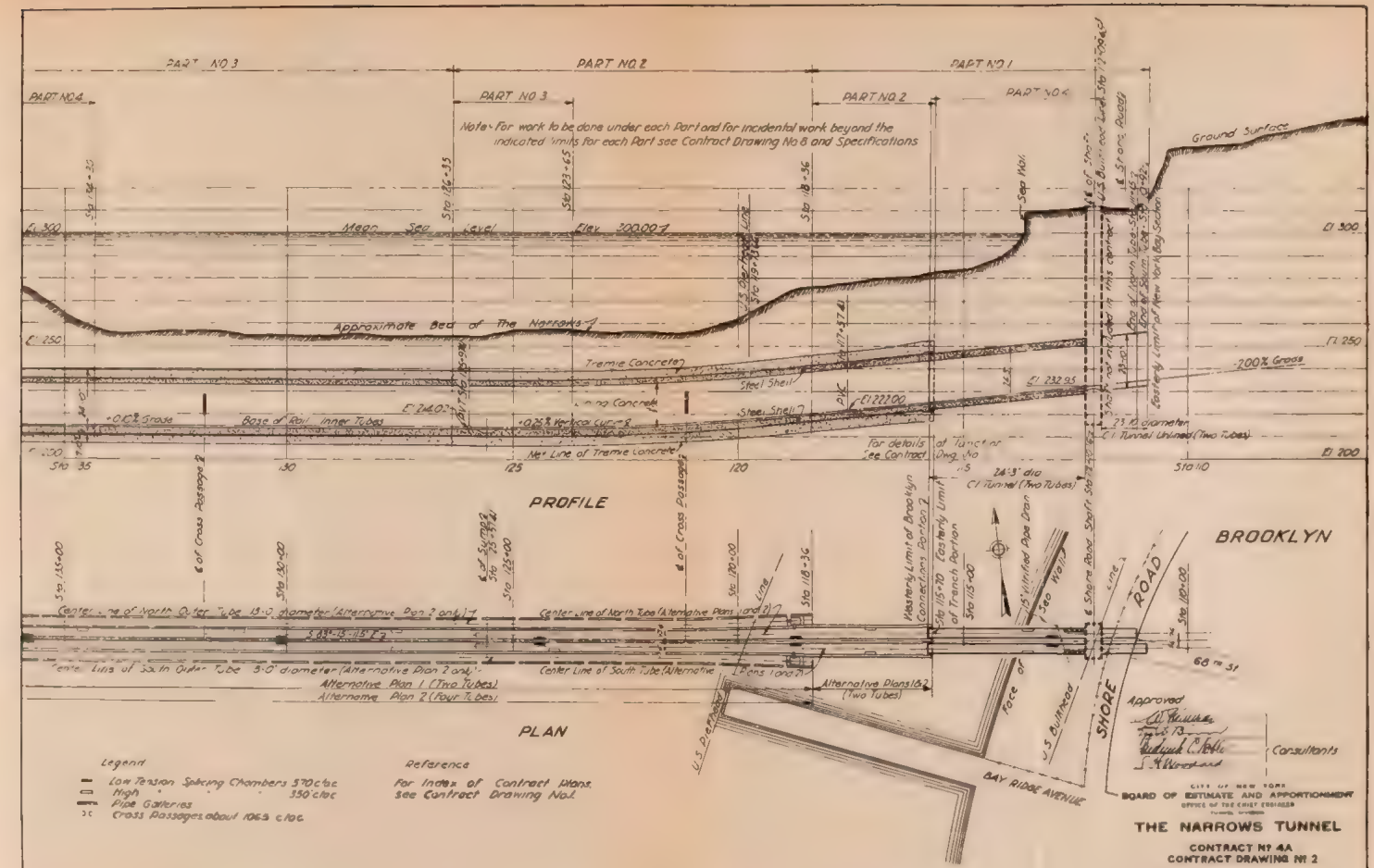
THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 1

LOCATION PLAN AND PROFILE

Drawn J.A.C.
Traced J.B.C.
Checked J.B.

FILE Nº C4A


PART NO 3
PART NO 2
PART NO 1
PART NO 4
PART NO 3
PART NO 2
PART NO 4
Note: For work to be done under each Part and for incidental work beyond the indicated limits for each Part see Contract Drawing No 8 and Specifications
Ground Surface
Mean Sea Level
Elev. 200.00
Approximate Bed of The Narrows
Tremie Concrete
Steel Shell
Base of Rail Inner Tubes
Met Line of Tremie Concrete
PROFILE
BROOKLYN
SHORE ROAD
Center Line of North Outer Tube 13'-0" diameter (Alternative Plan 2 only)
Center Line of North Tube (Alternative Plans 1 and 3)
Center Line of South Outer Tube 13'-0" diameter (Alternative Plan 2 only)
Center Line of South Tube (Alternative Plans 1 and 3)
Alternative Plan 1 (Two Tubes)
Alternative Plan 2 (Four Tubes)
Alternative Plans 1 & 2 (Two Tubes)
PLAN
Legend
Low Tension Splicing Chambers 570' c/c
High " 350' c/c
Pipe Galleries
Cross Passages about 1065 c/c
Reference
For Index of Contract Plans see Contract Drawing No 1
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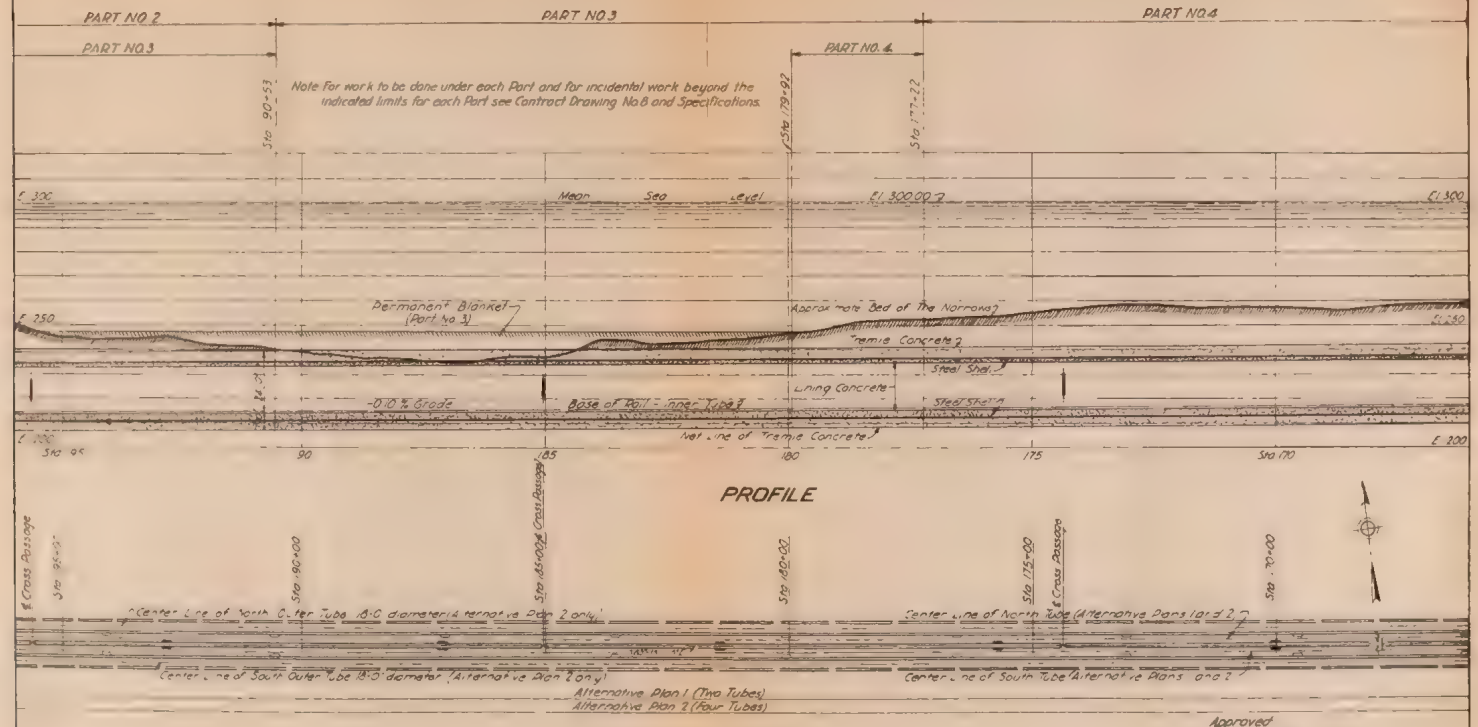
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 2
FILE Nº C4A

DETAILED PLAN AND PROFILE - STA. 110+92 TO STA. 136



Approved
W. Hamm
Engineer
Ingalls & Hollis
L. H. Woodard
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

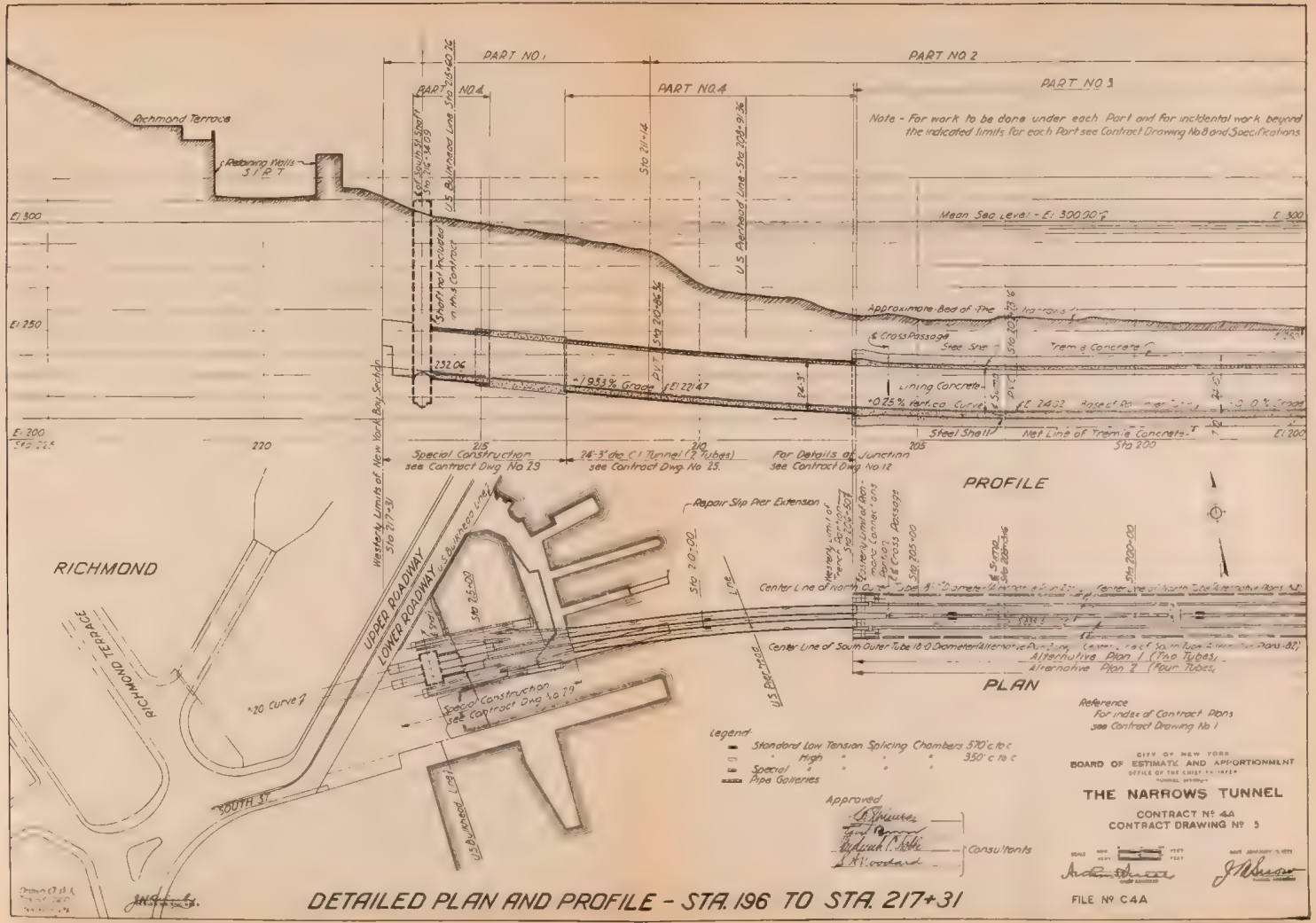
CONTRACT Nº 4A
CONTRACT DRAWING Nº 4

Legend
- Low Tension Splicing Chambers 570 c to c
- High " " 330 c to c
- 3 ℄ Cross Passages about 1065 c to c

Reference:
For Index of Contract Plans, see Contract Drawing No 1

DETAILED PLAN AND PROFILE - STA. 166 TO STA. 196

FILE Nº C4A


PART NO. 1
PART NO. 2
PART NO. 3
PART NO. 4
PART NO. 4
Note - For work to be done under each Part and for incidental work beyond the indicated limits for each Part see Contract Drawing No. 8 and Specifications
Richmond Terrace
Retaining Walls
Sta 217+31
U.S. Pierhead Line - Sta 203+96
U.S. Bulkhead Line - Sta 213+40.26
Sta 211+42
Sta 206+65.36
Mean Sea Level - El. 300.00
El. 300
El. 250
El. 200
Approximate Bed of The Narrows
Cross Passage
Steel Shell
Trem'e Concrete
Lining Concrete
+0.75% Vert. Curve
-0.75% Vert. Curve
-1.933% Grade
El. 224.7
232.06
24.3'
Steel Shell
Net Line of Tremie Concrete
Sta 200
Special Construction see Contract Dwg. No. 29
24'-3" dia. (1 Tunnel (2 Tubes) see Contract Dwg. No. 25.
For Details at Junction see Contract Dwg. No. 12
Western Limits of New York Bay Section Sta 217+31
PROFILE
RICHMOND
RICHMOND TERRACE
SOUTH ST.
UPPER ROADWAY
LOWER ROADWAY
U.S. Bulkhead Line
Repair Slip Pier Extension
Sta 20+00
Sta 16+00
Center Line of North Outer Tube 18'-0" Diameter Alternative Tunnel (Same Type as Tunnel Shown)
Center Line of South Outer Tube 18'-0" Diameter Alternative Tunnel (Same Type as Tunnel Shown)
Alternative Plan 1 (Two Tubes)
Alternative Plan 2 (Four Tubes)
Special Construction see Contract Dwg. No. 29
U.S. Pierhead Line
PLAN
Legend
Standard Low Tension Splicing Chambers 570' c to c
High " " " 350' c to c
Special " " "
Pipe Galleries
Reference
For index of Contract Plans see Contract Drawing No. 1
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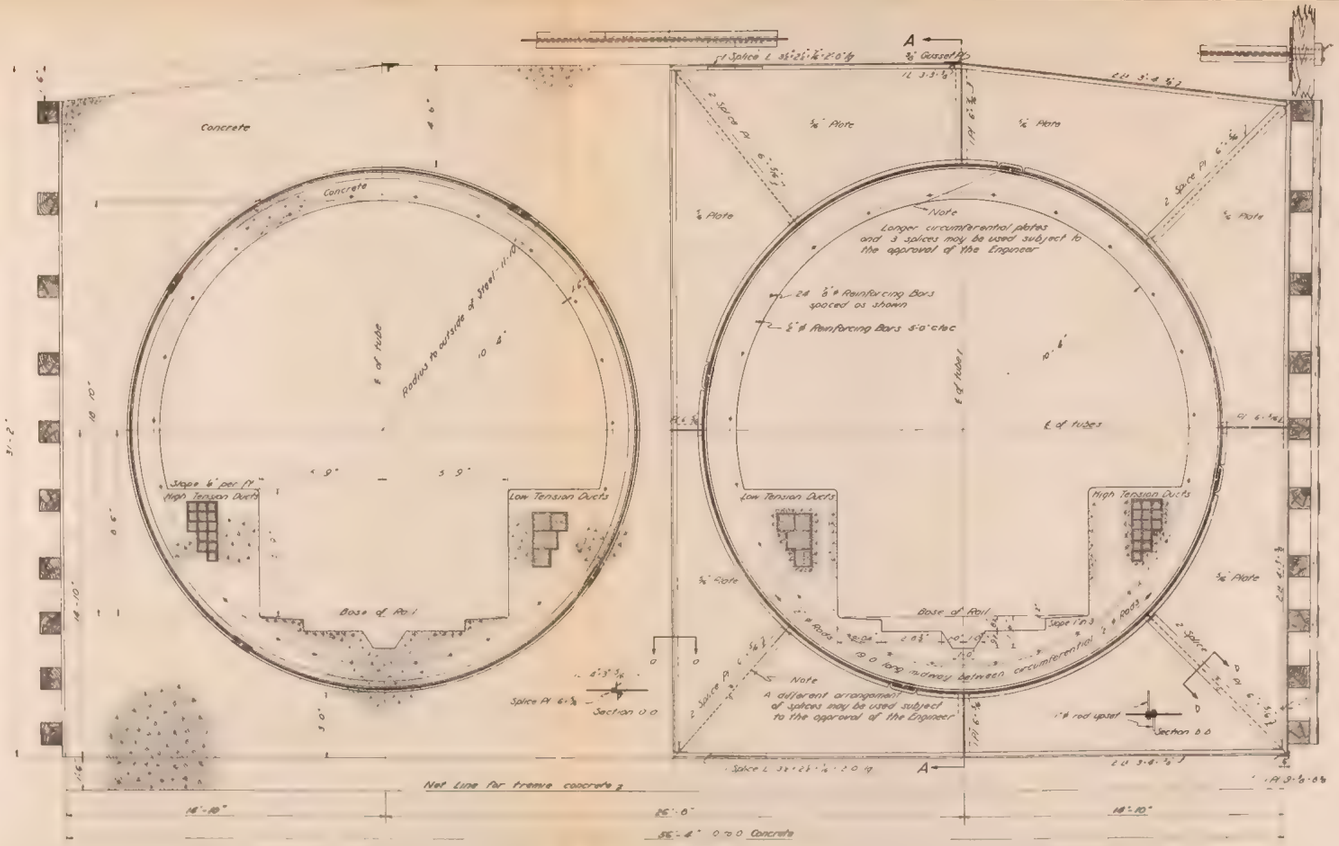
OFFICE OF THE CHIEF ENGINEER
THE NARROWS TUNNEL
CONTRACT No. 4A
CONTRACT DRAWING No. 5
FILE No. C4A

DETAILED PLAN AND PROFILE - STA. 196 TO STA. 217+31

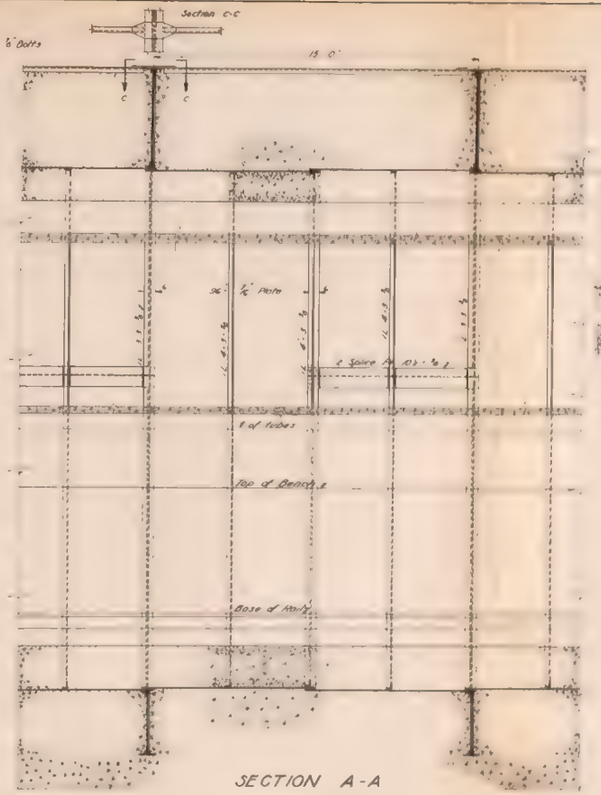

Concrete
Radius to outside of Steel 11'-11"
Slope 6" per ft
High Tension Ducts
Low Tension Ducts
Base of Rail
Splice PL 6'-3"
Section 0-0
Note
Longer circumferential plates and 3 splices may be used subject to the approval of the Engineer
24 1" ϕ Reinforcing Bars spaced as shown
2 1" ϕ Reinforcing Bars 5'-0" c to c
Note
A different arrangement of splices may be used subject to the approval of the Engineer
1" ϕ rod upset
Section D-D
Net Line for Trench Concrete
5'-4" to 0'-0" Concrete

HALF SECTION BETWEEN DIAPHRAGMS

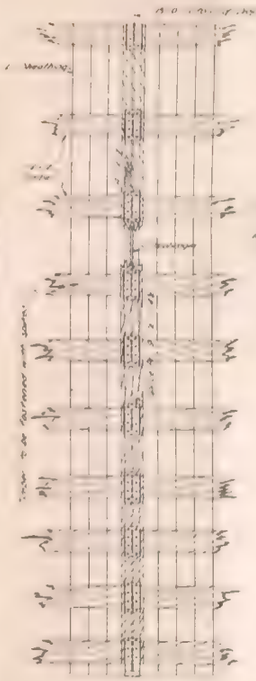
HALF SECTION AT DIAPHRAGMS

TYPICAL CONSTRUCTION - TRENCH PORTION

ALTERNATIVE PLAN I



SECTION A-A



SIDE VIEW

NOTES

Temporary bracing will be required in the interior of the tubes during sinking and concreting operations.

All shell riveting to be made water tight. Caulking edges to be planed or bevel chamfered.

Rivets ⅞" diameter

REFERENCE

For Index of Contract Plans, see Contract Drawing No. 1

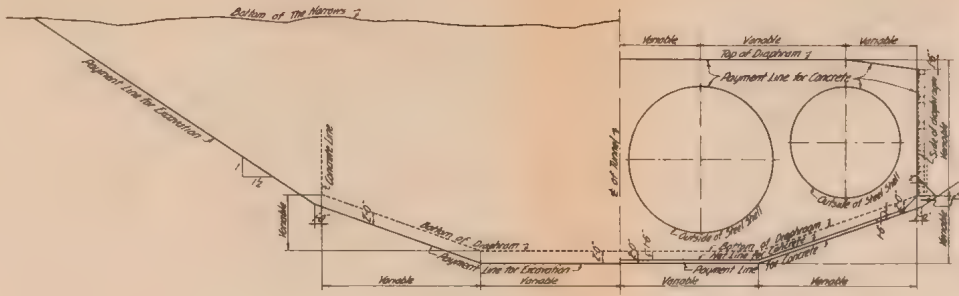
Designed
C. Stevens
F. H.
Clifford E. Betts
L. A. Woodard
Consultants

THE NARROWS TUNNEL

CONTRACT No 4A

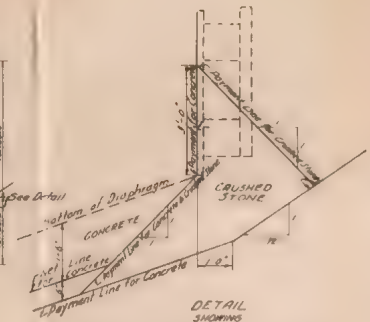
CONTRACT DRAWING No 6

FILE No C4A



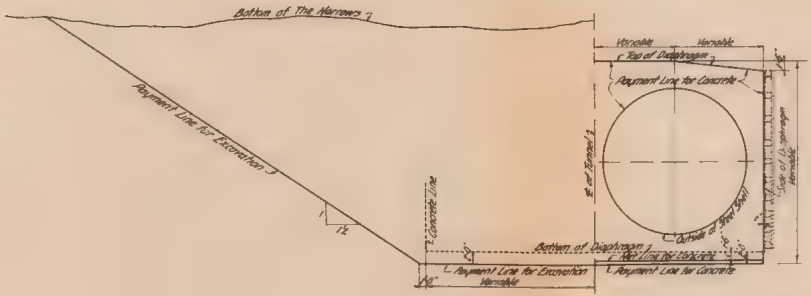
HALF-SECTION FOR EXCAVATION HALF-SECTION FOR EXTERIOR CONCRETE AND CRUSHED STONE

ALTERNATIVE PLAN 2
EXCEPT EASTERLY SECTION



DETAIL
SHOWING
PAYMENT LINES FOR CRUSHED STONE AND CONCRETE AT CORNER

SCALE 1 INCH=5 FEET



HALF-SECTION FOR EXCAVATION HALF-SECTION FOR EXTERIOR CONCRETE

ALTERNATIVE PLAN 1
AND EASTERLY SECTION OF ALTERNATIVE PLAN 2

NOTES:
Net payment quantities of exterior concrete do not to include embedded steel
Net payment quantities of Crushed Stone not to include embedded timber
REFERENCE
For Index of Contract Plans, see Contract Drawing No. 1.

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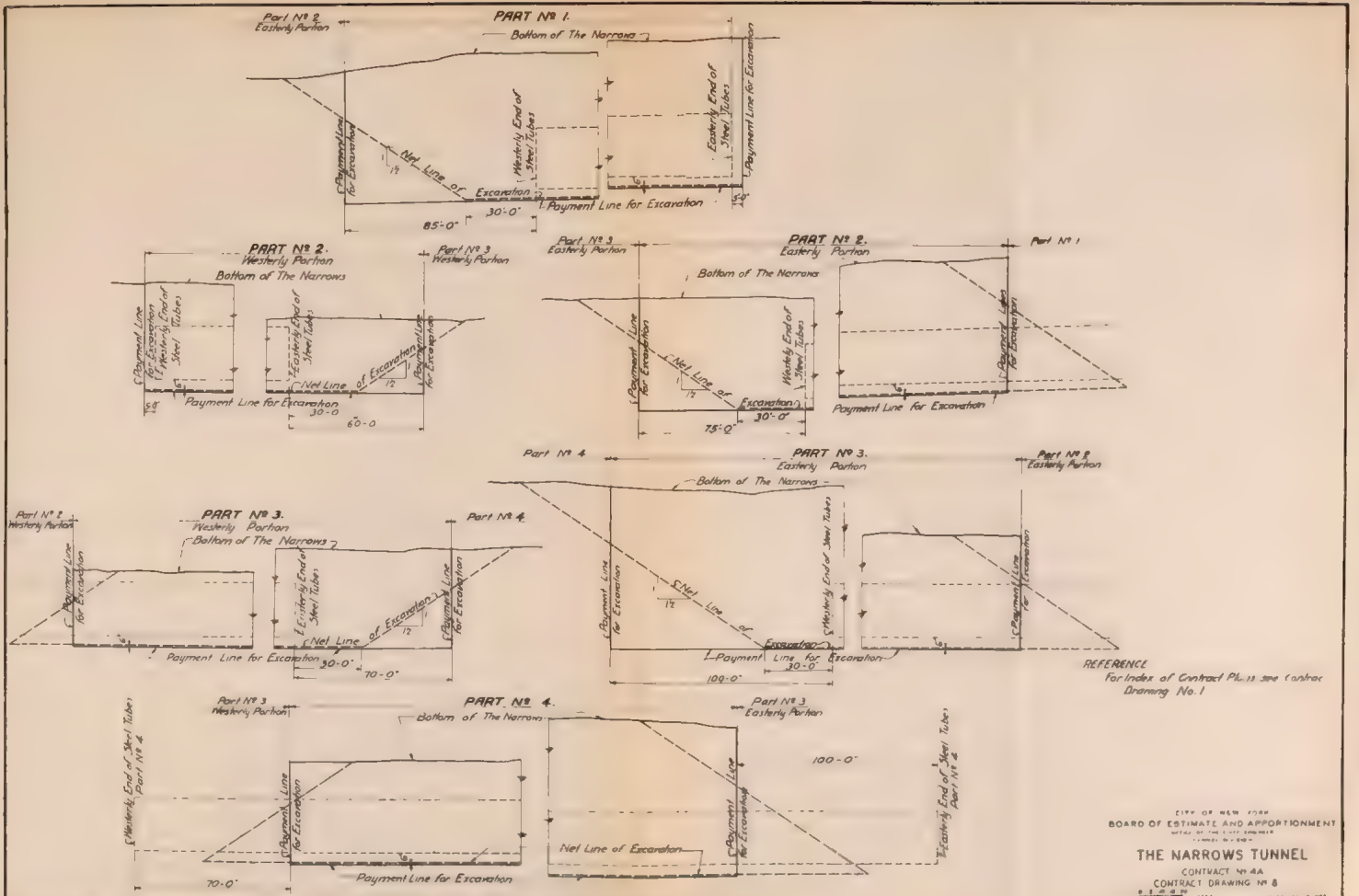
Consultants.

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 7

FILE Nº C4A

PAYMENT LINES, TRENCH PORTION
See Also Dwg. No. 8.



REFERENCE
For Index of Contract Plans see Contract Drawing No. 1

Drawn by W.H.
Traced W.J.
Checked - C.G.A.

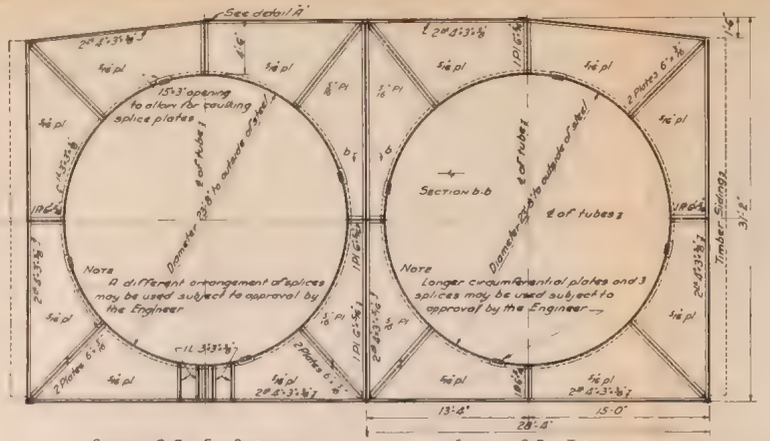
PAYMENT LINES, TRENCH PORTION

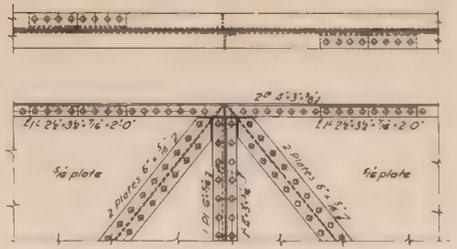
AT ENDS OF PARTS
See Also Drawing № 7.

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT

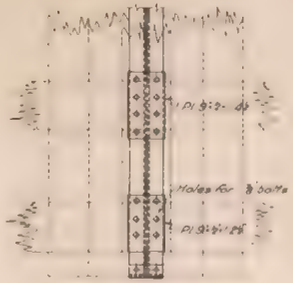
THE NARROWS TUNNEL
CONTRACT № 4A
CONTRACT DRAWING № 8

FILE № C.4A

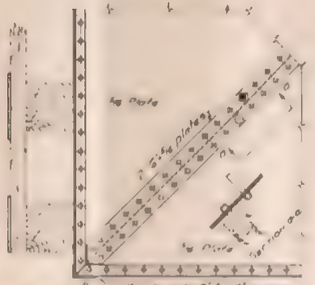

See detail A
15'x3' opening to allow for coupling splice plates
Section b-b
℄ of tubes
Diameter 23'8" to outside of shell
Note
A different arrangement of splices may be used subject to approval by the Engineer
Note
Longer circumferential plates and 3 splices may be used subject to approval by the Engineer
Timber Siding
13'-4"
28'-4"
15'-0"



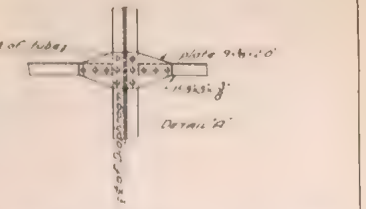
Detail of Splice At Top Center of Diaphragm



Detail of Splice Plates

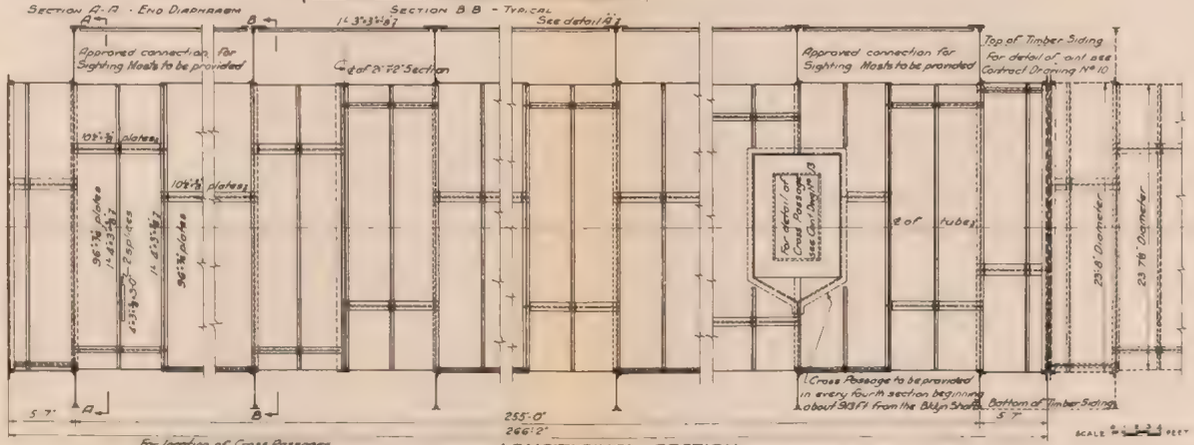


Detail of Riveting at Lower Corners of Diaphragm



Section A-A - End Diaphragm

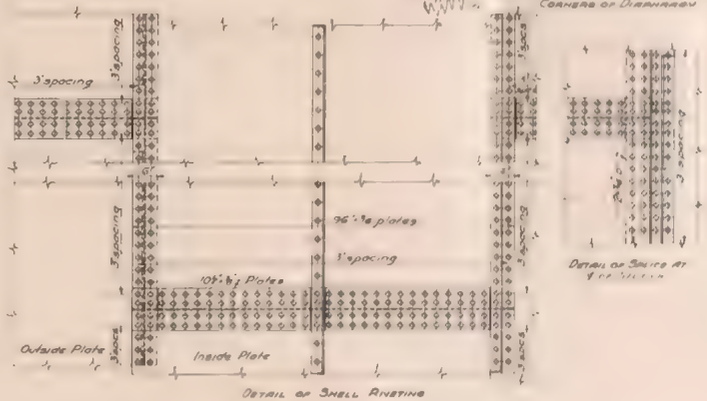
Section B-B - Typical


Approved connection for Sighting Masts to be provided
℄ of 2'-7½" Section
See detail A
Approved connection for Sighting Masts to be provided
Top of Timber Siding
For detail of Land Portion see Contract Drawing No 10
℄ of tubes
23'6" Diameter
23'7½" Diameter
Cross Passage to be provided in every fourth section beginning about 93'1" from the Bklyn Shaft
Bottom of Timber Siding
5'7"
255'-0"
266'2"

LONGITUDINAL SECTION

Grillage See Contract Drawing No 18
For location of Cross Passages See in number, see Cont. Dwg. Nos 2,3 & 5
266'2"
℄ of tunnel
℄ of tubes
26'-0" Out of Out of Tubes

DIAGRAMMATIC PLAN OF HALF SECTION



Detail of Shell Riveting

Detail of Splice at ℄ of Tubes

Steel Sections Required

1 Junction Section East End	266'2"
2 Intermediate Sections with distance c to c varying	53'4"
30 Typical Sections as shown @ 266'2"	7985'0"
1 Junction Section West End	266'2"
1 Closing Section (about)	30'4"
Total from Sta 115+70 to Sta 206+30	9080'0"

Notes

Details shown are for Alternative Plan 1 (two tubes). For Alternative Plan 2 (four tube) construction see Contract Drawing No 19

All shell riveting to be caulk watertight

Caulking edges to be planed or bevel sheared

Rivets ⅞ diameter

Reference

For Index of Contract Plans, see Contract Drawing No 1

Approved

Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

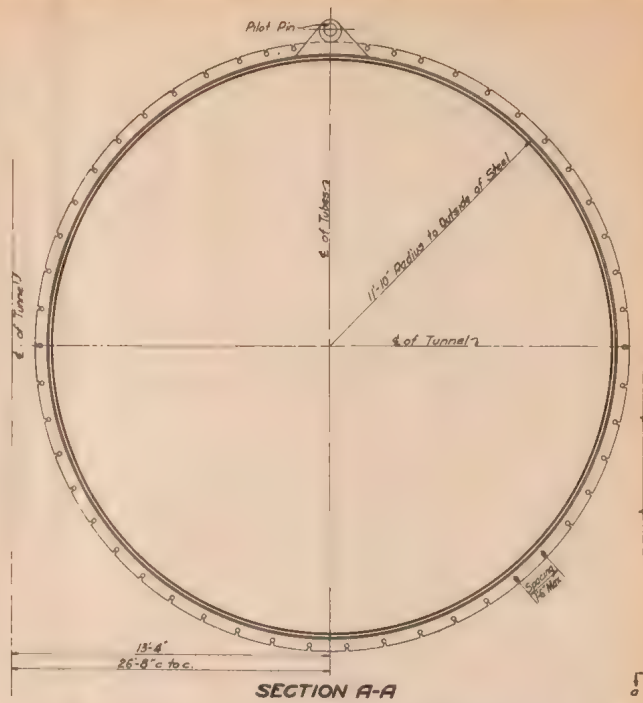
THE NARROWS TUNNEL

CONTRACT No 4A
CONTRACT DRAWING No 9

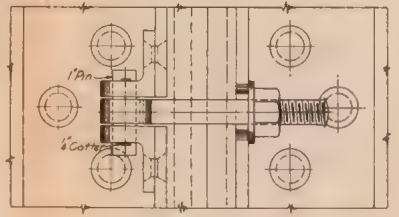
FILE No C4A

Drawn JDS
Traced JDS
Checked H.T.M. J.C.L.

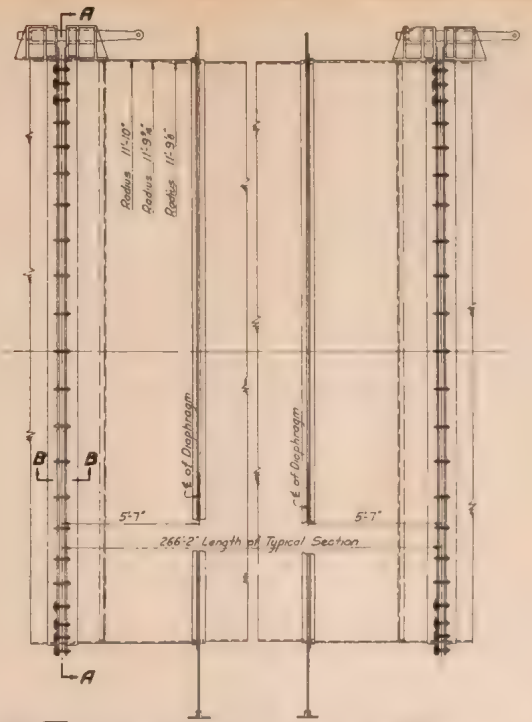
TYPICAL STEEL SECTION TRENCH PORTION
ALTERNATIVE PLAN 1



SECTION A-A



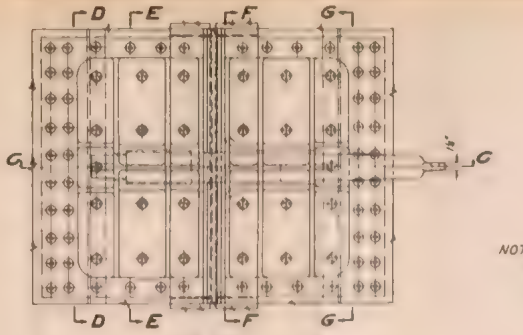
Section a-a



ELEVATION OF TUBE SECTION

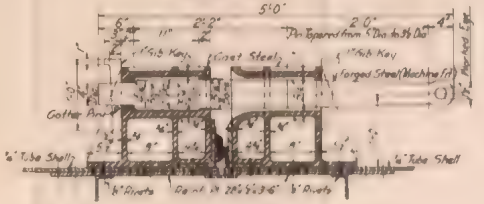
Showing Joints

Scale ——— Feet



PLAN

Scale ——— Inches



SECTION G-G

Showing Detail of Steel Pilot Pin

NOTES

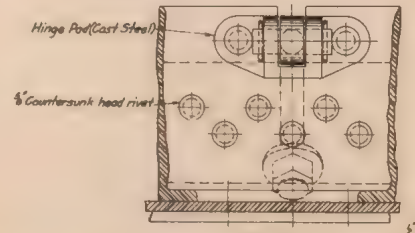
Details shown are for Alternative Plan 1 (two tubes)

For Alternative Plan 2 (four tubes) the above applies to the inner tubes, and the construction of the joint for the outer tubes, 15'-0" diameter, is to be similar.

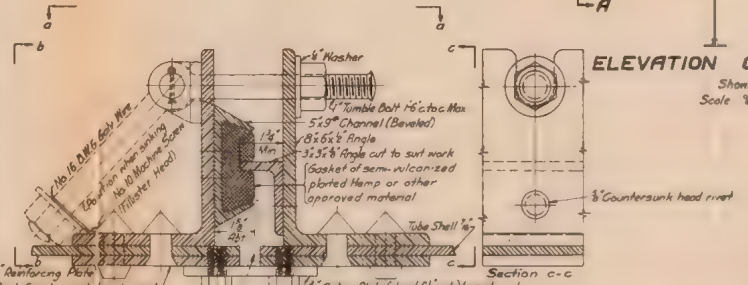
Rivets ¾" ϕ except as noted

REFERENCE

For Index of Contract Plans, see Contract Drawing No. 1



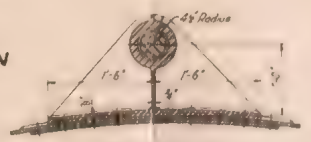
Section b-b


a
b
a
c
¾" Washer
1" Tumble Bolt 1'-6" c to c Max
5"x3" Channel (Beveled)
8"x6"x⅝" Angle
3½"x3½"x⅝" Angle cut to suit work
Gasket of semi-vulcanized plated Hemp or other approved material
1¾" Min
Tube Shell ⅝"
¾" Countersunk head rivet
¾" Reinforcing Plate
Flush Countersunk head rivet
Interior Joint to be filled with cement grout or other approved material
¾" Splice Plate (about 5½" wide) to suit work
¾" Top Bolts, or Stud Bolts, spaced 3'-0" c to c
b
c

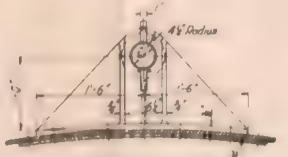
Section c-c

SECTION B-B

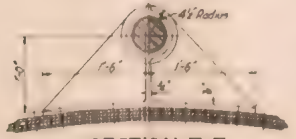
Scale ——— Inches



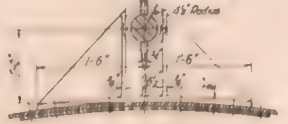
SECTION E-E



SECTION D-D



SECTION F-F



SECTION G-G

Approved

Consultants

CITY OF NEW YORK

BOARD OF ESTIMATE AND APPORTIONMENT

OFFICE OF THE CHIEF ENGINEER

TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT No. 4A

CONTRACT DRAWING No. 10

MAJOR W. GILSON — DEPUTY CHIEF ENGINEER

J. H. WILSON — TUNNEL ENGINEER

FILE No. C4A

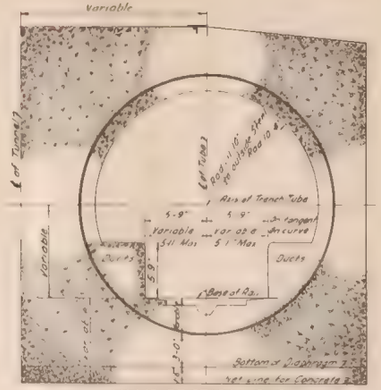
Drawn [illegible]

Traced [illegible]

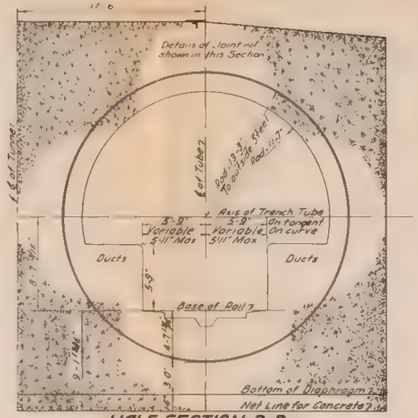
Checked [illegible]

TYPICAL TUBE JOINT, PILOT PIN, AND CASTINGS

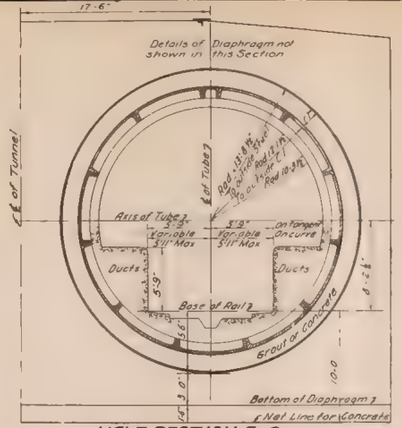
TRENCH PORTION



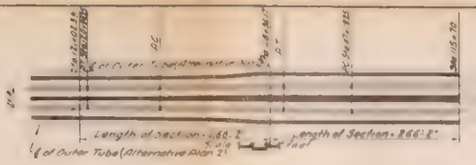
HALF SECTION A-A

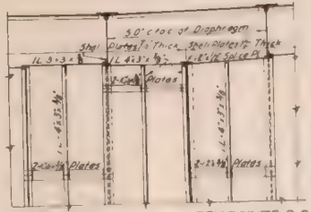


HALF SECTION B-B



HALF SECTION C-C





SHELL PLATING BETWEEN POINTS D-D

TYPICAL SHELL PLATE RIVETING FOR ENLARGED SECTION OF TUBE

For other steel details see Contract Drawing No 9

NOTES

Temporary bracing will be required in the interior of the tubes during sinking and concreting operations

Details shown are for Alternative Plan 1 (two tubes) For Alternative Plan 2 (four tubes) the above details apply to the inner tubes

The construction of the outer tubes, 80' diameter is to be similar, the enlarged end to join a future cast iron tunnel at Sta 18+36.17

All riveting in shell plates to be made watertight Caulking edges to be planed or bevel sheared

Rivets 3/4" diameter for 7/16" plating

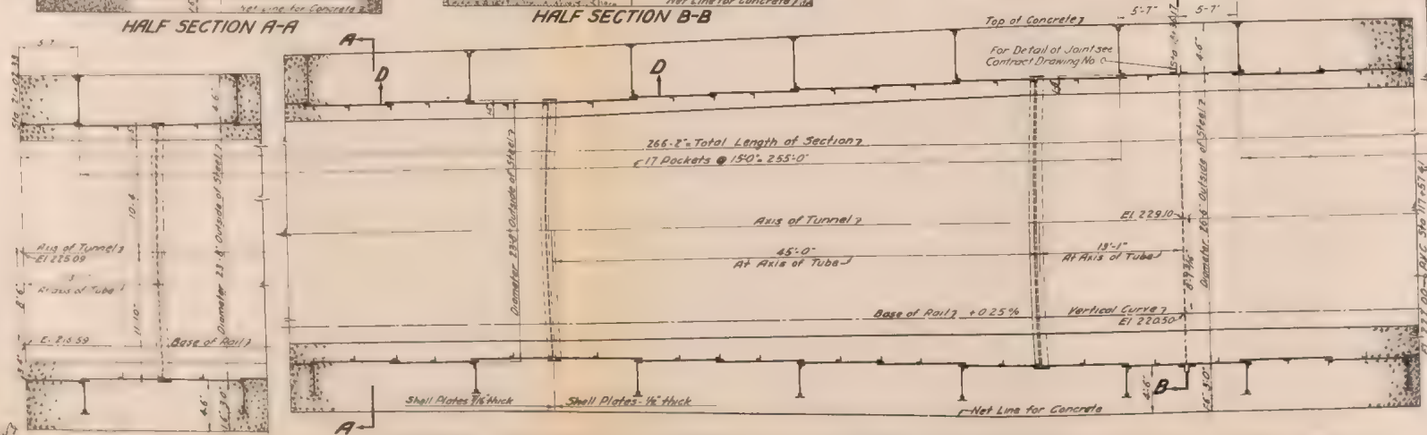
Rivets 7/8" diameter for 1/2" plating

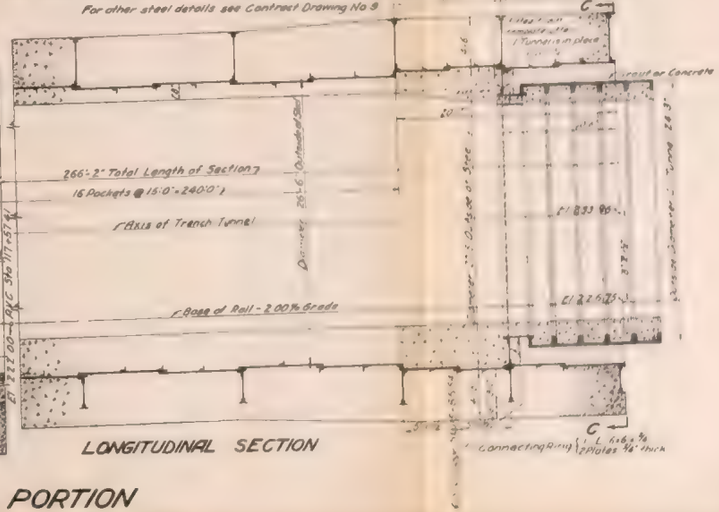
The design of the junction section may be modified if desired, subject to the approval of the engineer

All longitudinal dimensions refer to ℄ of Survey

REFERENCE

For Index of Contract Plans, see Contract Drawing No 1




266'-2" Total Length of Section
16 Pockets @ 15'0" = 240'0"
℄ Axis of Trench Tunnel
℄ Base of Rail - 2.00% Grade
Grout or Concrete
Connecting Ring
Plates 1/2" Thick

LONGITUDINAL SECTION

SPECIAL SECTIONS - EASTERLY JUNCTION, CAST IRON TUNNEL WITH TRENCH PORTION

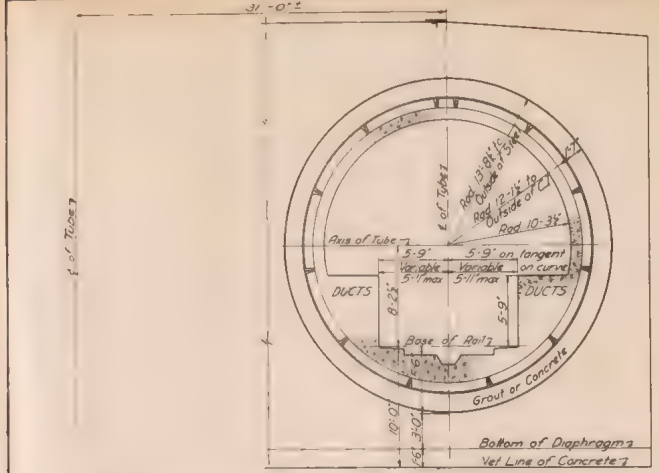
Approved

Consultants

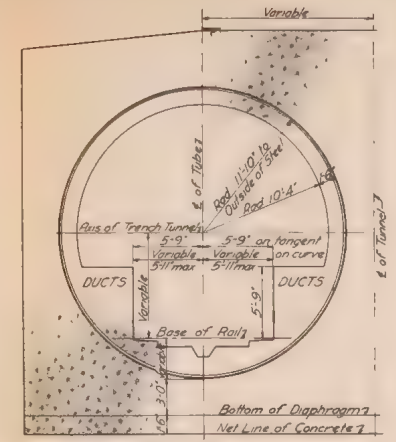
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL
CONTRACT NO 4A
CONTRACT DRAWING NO 11

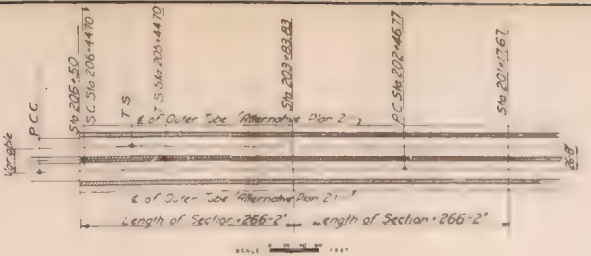
FILE NO C 4A

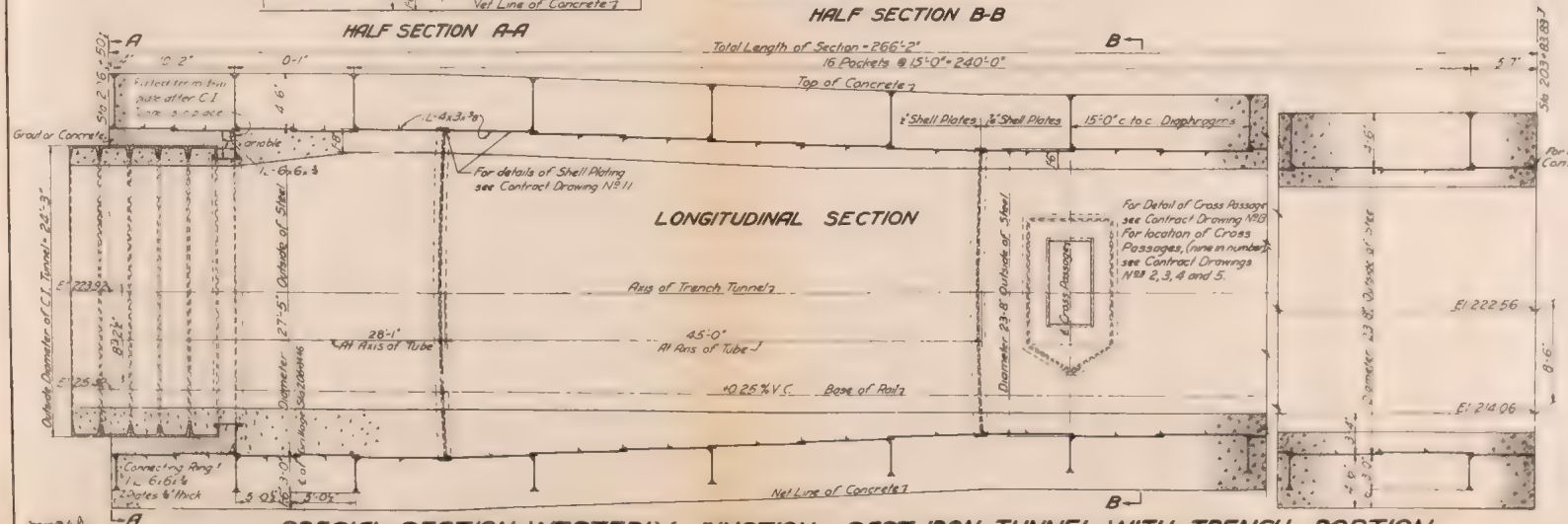


HALF SECTION A-A



HALF SECTION B-B





SPECIAL SECTION WESTERLY JUNCTION, CAST IRON TUNNEL WITH TRENCH PORTION

NOTES

Temporary bracing will be required in the interior of the tubes during sinking and concreting operations

Details shown are for Alternative Plan 1 (Two tubes) For Alternative Plan 2 (four tubes) the above details apply to the inner tubes The construction of the outer tubes, 19'-0" diameter, is to be similar, the enlarged end to join a future Cast Iron Tunnel at Sta 206+50

All riveting in shell plates to be made watertight Caulking edges to be planed or bevel sheared

Rivets ¾" ⌀ for ½" plating, ⅝" ⌀ for ⅜" plating

Typical shell plating and riveting as shown on Contract Drawing No 11

The design of the junction section may be modified, if desired, subject to the approval of the Engineer

All longitudinal dimensions refer to centre line of Survey and centre line tangent produced beyond the T.S at Sta 205+44.70

REFERENCE

For Index of Contract Plans, see Contract Drawing No. 1

Approved

Consultants

STATE OF NEW YORK

BOARD OF ESTIMATE AND APPORTIONMENT

OFFICE OF THE CHIEF ENGINEER

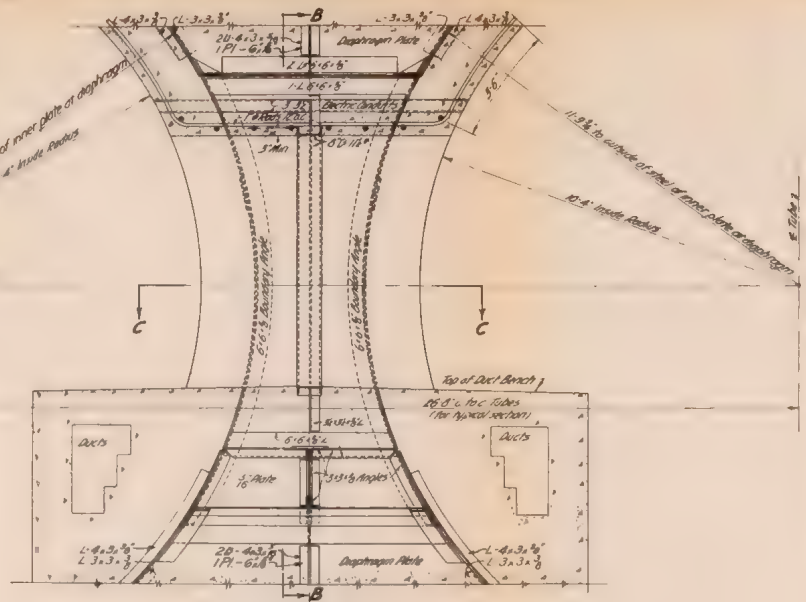
AND OF

THE NARROWS TUNNEL

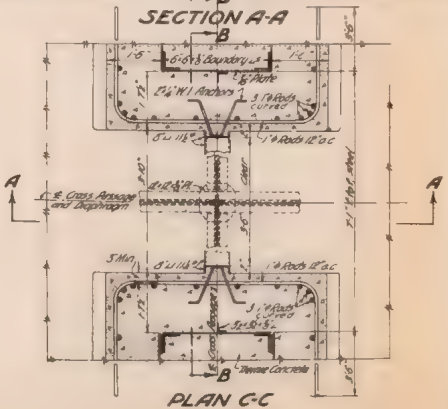
CONTRACT No 4A

CONTRACT DRAWING No 12

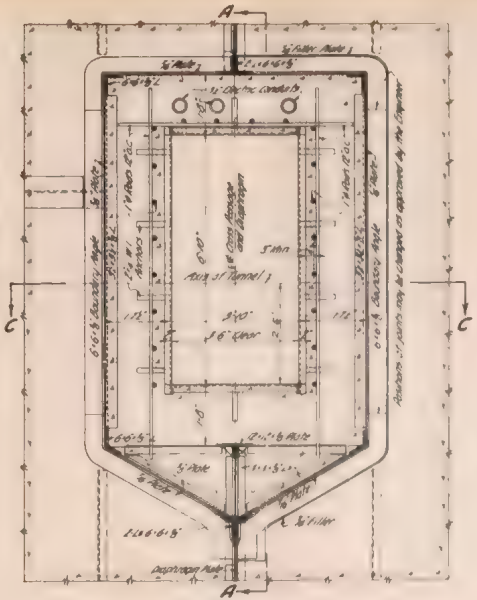
FILE No C4A



SECTION A-A



PLAN C-C



SECTION B-B

NOTES

REFERENCE

CROSS PASSAGE - TRENCH PORTION

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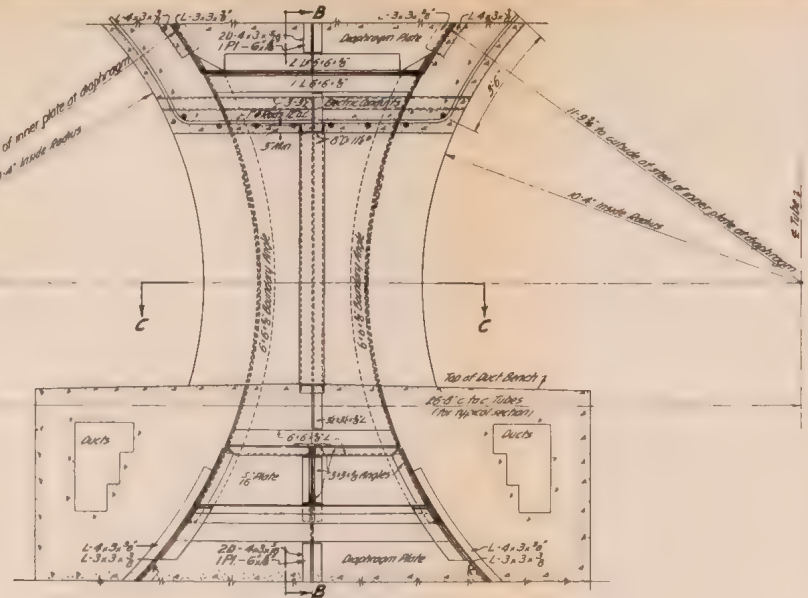
Consultants

BOARD OF ESTIMATE AND APPORTIONMENT

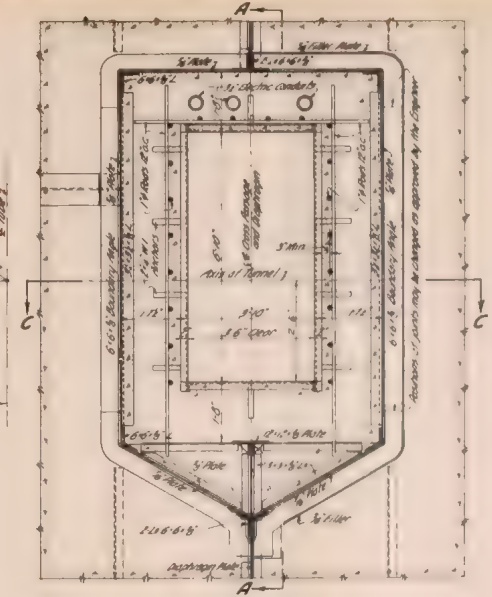
THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 13

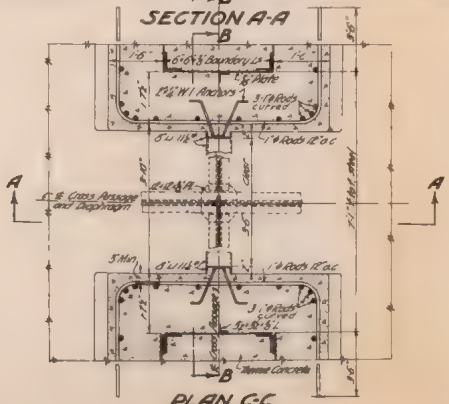
FILE Nº C4A



SECTION A-A



SECTION B-B



PLAN C-C

CROSS PASSAGE - TRENCH PORTION

NOTES

All Steel is ASTM A-36

REFERENCE

For Index of Contract Plans see Contract Drawing No. 1

Approved
Consulting Engineers

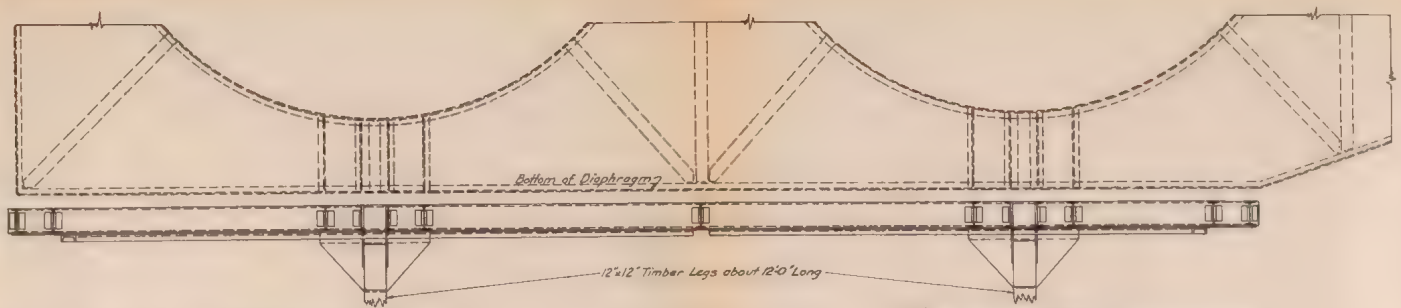
BOARD OF ESTIMATE AND APPORTIONMENT

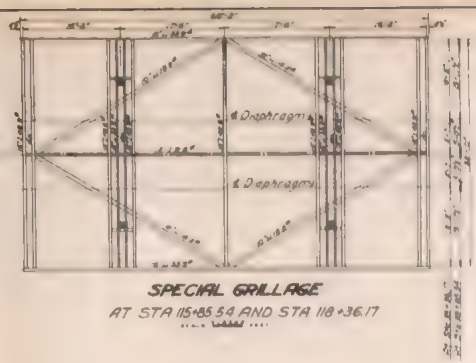
THE NARROWS TUNNEL

CONTRACT No 4A

CONTRACT DRAWING No 13

FILE No C4A

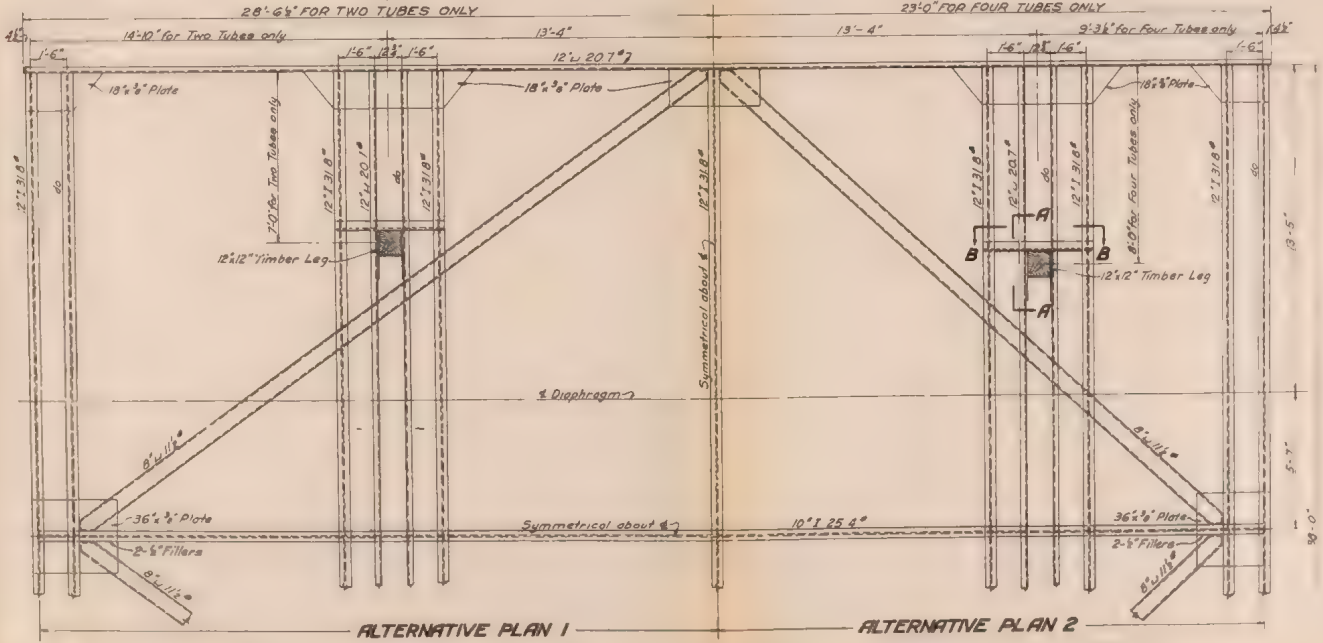




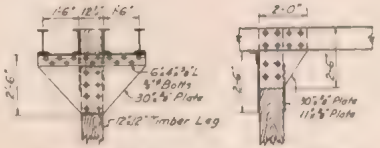
SPECIAL GRILLAGE
AT STA 115+85.54 AND STA 118+36.17

NOTE
The Contractor may substitute other forms of grillage or landing platform, subject to approval of the Engineer, and provided that the Contractor shall bear any additional cost involved thereby

REFERENCE
For Index of Contract Plans, see Contract Drawing No 1.



TYPICAL GRILLAGE OR LANDING PLATFORM TRENCH PORTION



SECTION B-B

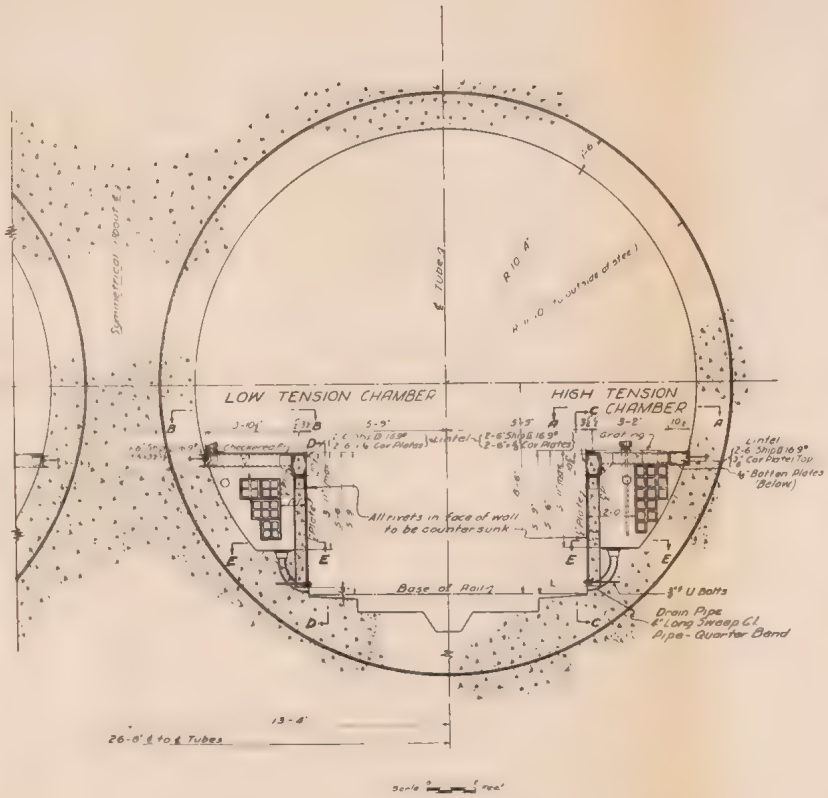
SECTION A-A

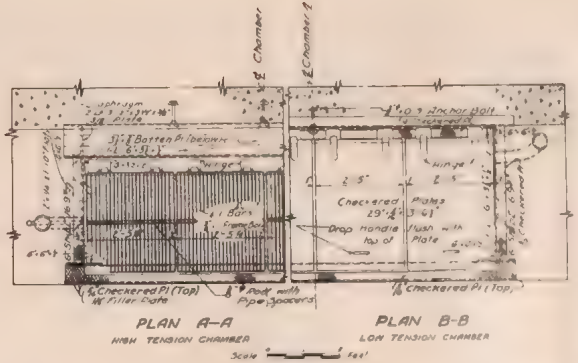
Approved:
Consultants

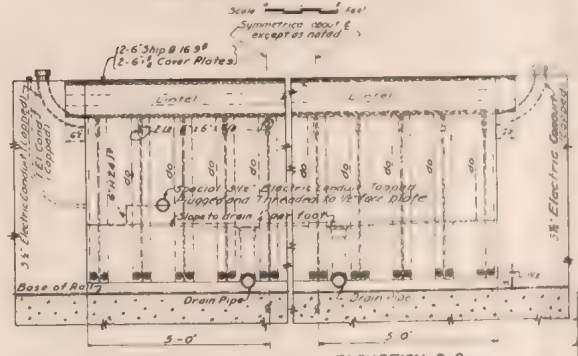
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 14

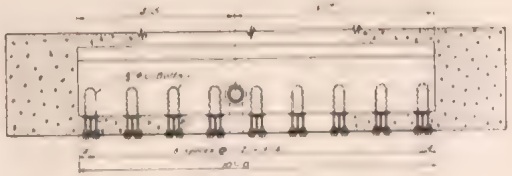
FILE Nº C4A







NOTE: 1" Electric Conduit to be provided at every third High Tension Chamber and at one end of Chamber only. One Drain per Chamber located off center as shown.



NOTES

HIGH TENSION SPLICING CHAMBER -

Chambers spaced 9.70 feet apart in each tube. One chamber required in each shaft opposite to low tension splicing chamber. See Drawings Nos. 43, 44, 45 & 46. Chambers symmetrical 1.75 feet each side of center line of spe ial splicing chamber at station 6+1.12

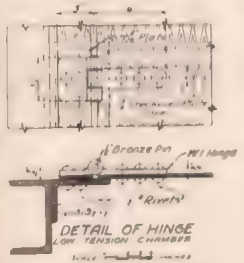
LOW TENSION SPLICING CHAMBER

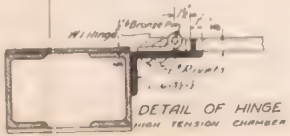
Chambers spaced 9.70 feet apart in each tube. One chamber to be located on inside of each shaft, one on west end of Brooklyn Shaft and one on east end of Richmond Shaft. See Drawings Nos. 43, 44, 45 & 46. One chamber to be spaced 9.70 feet each side of special splicing chamber at station 184+32

All work called for is to be the same for Alternative Plan I (two tubes) and Alternative Plan II (four tubes)

REFERENCE

For Index of Contract Plans, see Contract Drawing No. 1





BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

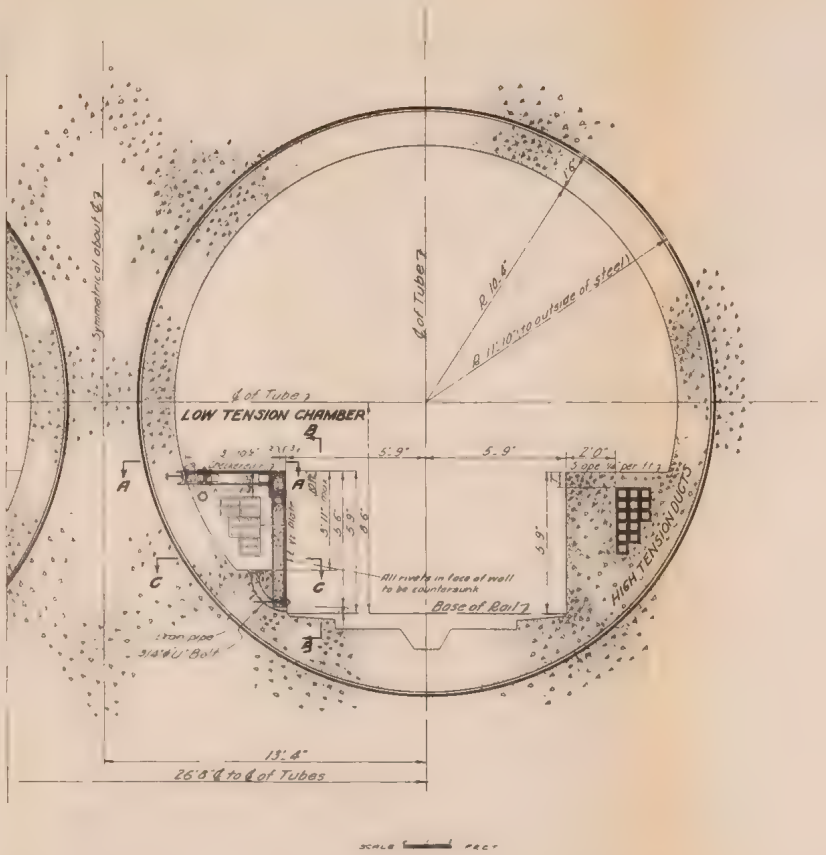
THE NARROWS TUNNEL

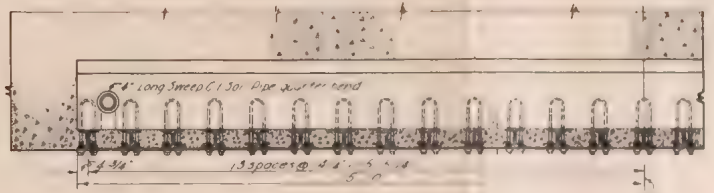
CONTRACT No. 4A
CONTRACT DRAWING No. 15

FILE No. C4A

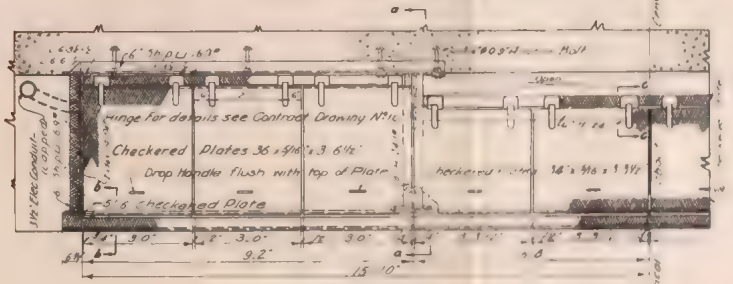
STANDARD SPLICING CHAMBERS - TRENCH PORTION

Drawn RC
Traced
Checked RCL

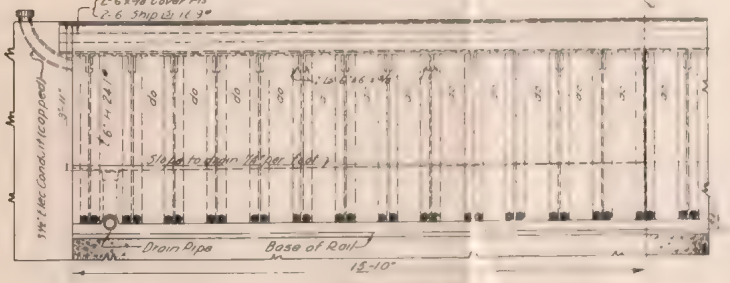




SECTION C-C

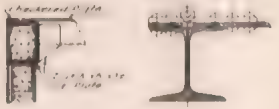

Hinge for details see Contract Drawing No 11
Checkered Plates 36 x 5/16" x 3'-6 1/2"
Drop Handle flush with top of Plate
5'-6" Checkered Plate
9'-2"
15'-10"

PLAN A-A



ELEVATION B-B

SECTION a-a



SECTION b-b

SECTION c-c

NOTE 1
One Special Splicing Chamber at Station 18+88 in each Tube. This chamber is for landing pots for telephone cables which will be placed on Duct Bank h.

All work called is to be the same for Alternative Plan 1 (two tubes) and Alternative Plan 2 (four tubes).

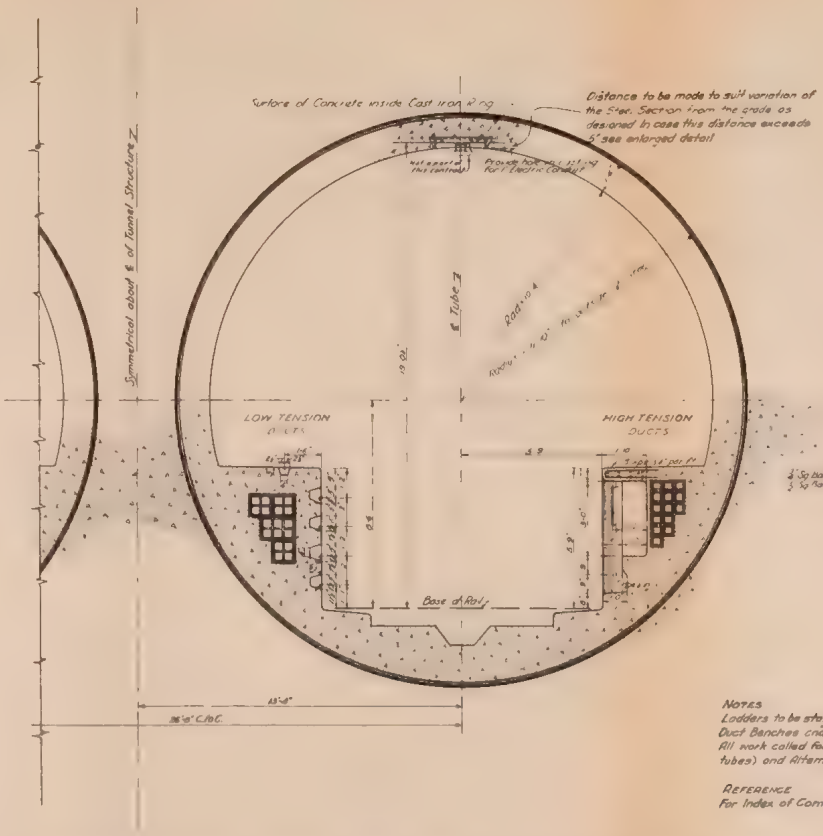
REFERENCE
For Index of Contract Plans see Contract Drawing No 1

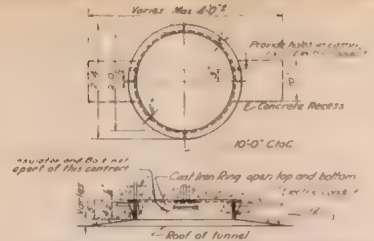
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 16

FILE Nº C-6A

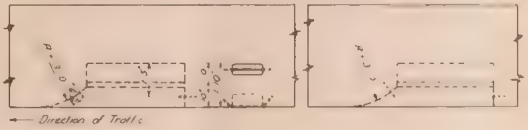
SPECIAL SPLICING CHAMBER - TRENCH PORTION


Surface of Concrete inside Cast Iron Ring
Distance to be made to suit variation of the Slope. Section from the grade as designed in case this distance exceeds 5' see enlarged detail
Symmetrical about ℄ of Tunnel Structure
℄ Tube
Radius
LOW TENSION DUCTS
HIGH TENSION DUCTS
Base of Rail
13'-4"
16'-0" C to C

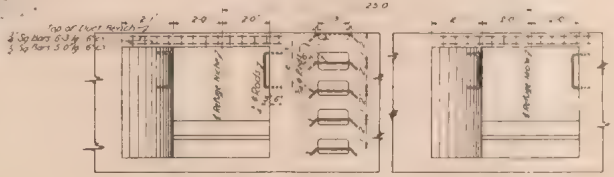


ENLARGED DETAIL OF ROOF POCKET

SCALE 0 1 FEET



PLAN



ELEVATION OF HIGH TENSION DUCT BENCH

NOTES
Ladders to be staggered along High and Low Tension Duct Benches and to be spaced 100 feet apart on each Bench
All work called for to be the same for Alternative Plan 1 (two tubes) and Alternative Plan 2 (four tubes)

REFERENCE
For Index of Contract Plans, see Contract Drawing No1

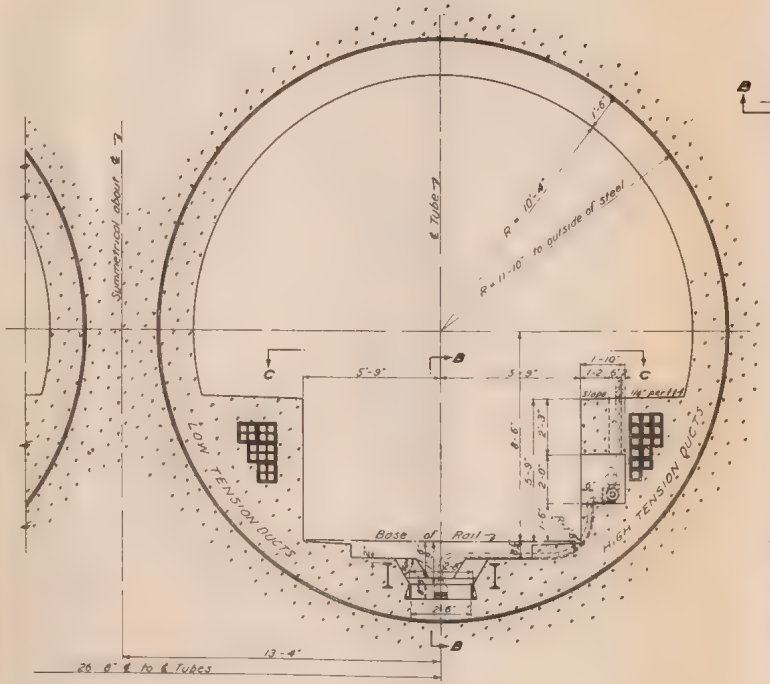
REFUGE NICHES, LADDERS AND ROOF POCKETS - TRENCH PORTION

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

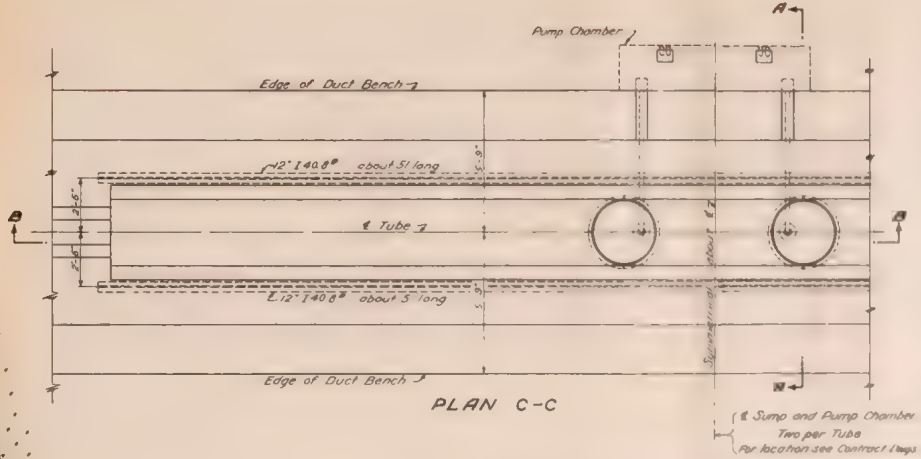
THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 17

Drawn
Traced
Checked

FILE No C-4A

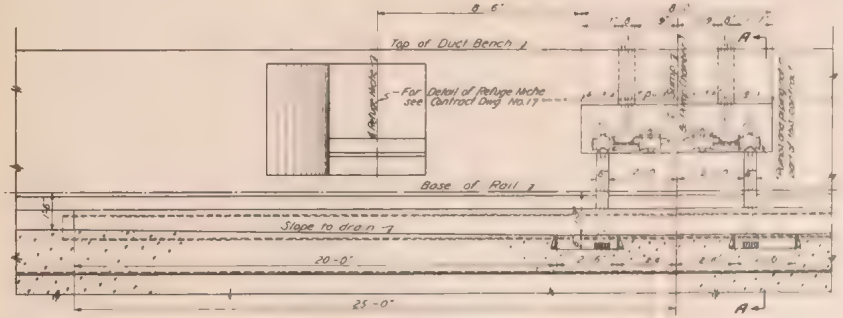


SECTION A-A



PLAN C-C

℄ Sump and Pump Chamber
Two per Tube
For location see Contract Dwgs Nos 2 & 5



SECTION B-B

DETAIL OF CAST IRON SUMP BOX

Note
All work called for is to be the same for Alternative Plan 1 (Two Tubes) and Alternative Plan 2 (Four Tubes)

Reference
For Index of Contract Plans, see Contract Drawing No 1

Approved
S. Stevens
Fred H. Stoltz
L. N. Woodard
Consultants

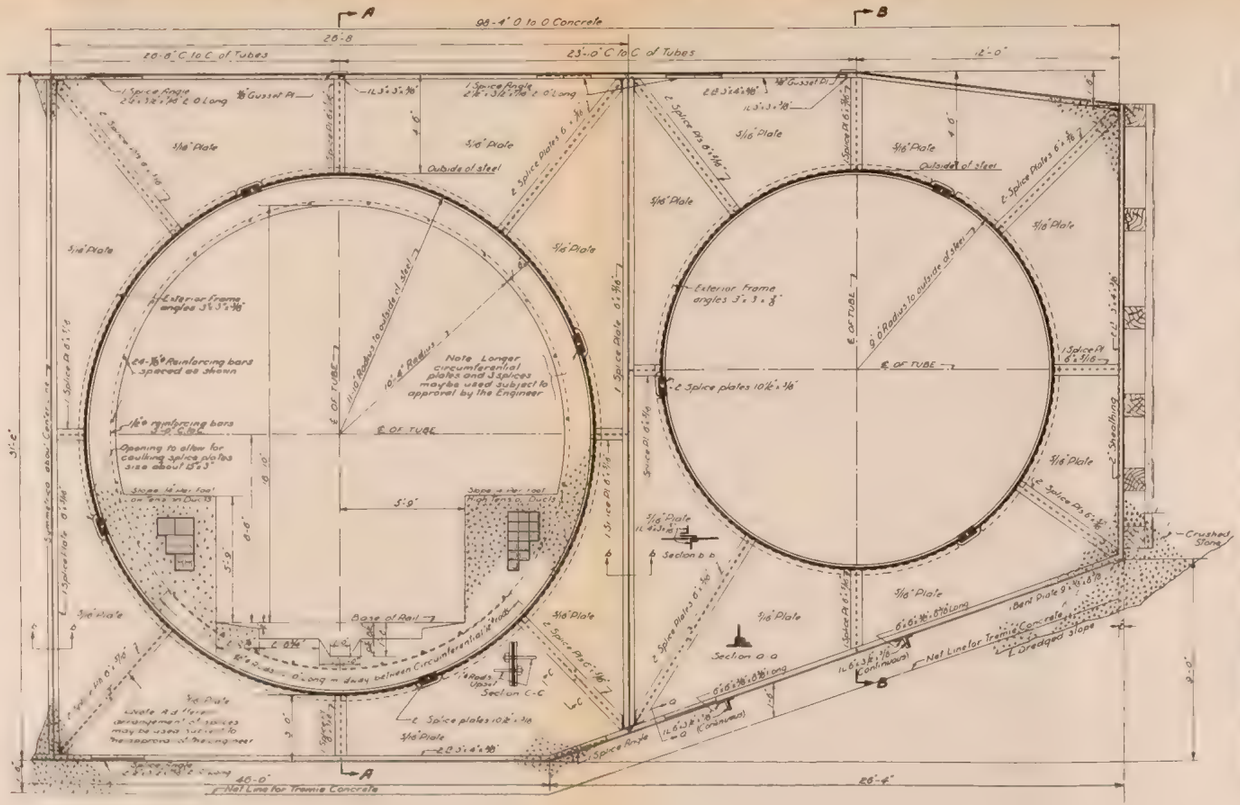
BOARD OF ESTIMATE AND APPORTIONMENT

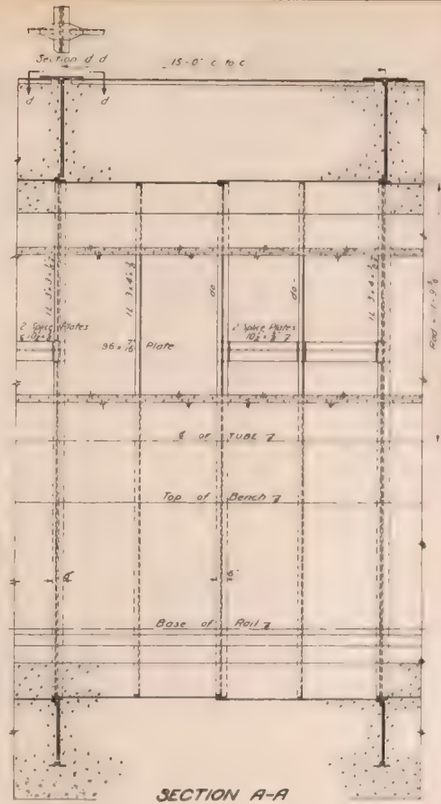
THE NARROWS TUNNEL
CONTRACT No 4 A
CONTRACT DRAWING No 18

FILE No C 4A

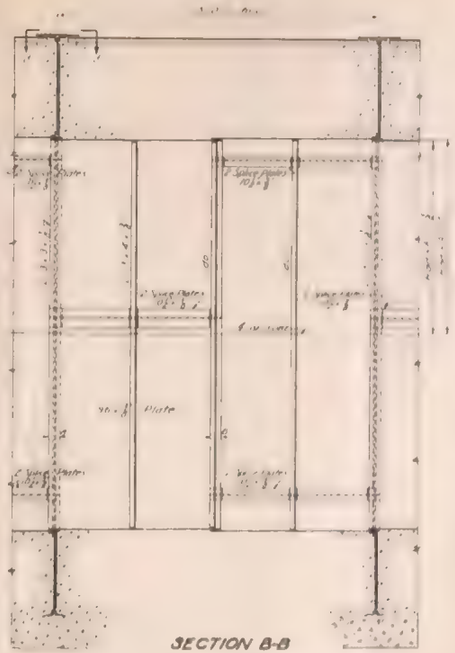
SUMPS AND PUMP CHAMBERS-TRENCH PORTION

Drawn A.C.
Traced S.C.
Checked T.J.R. A.C.I

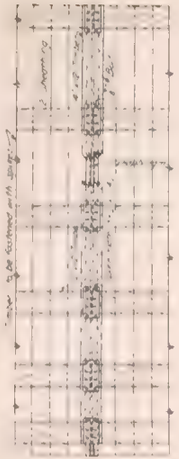




SECTION A-A



SECTION B-B



SIDE VIEW

NOTES
Temporary bracing will be required in the interior of the tubes during sinking and concreting operations.
All Shell riveting to be made machine tight
Caulking edges to be planed or bevel sheared
Rivets 7/8" diameter

REFERENCES
For Index of Contract Plans, see Contract Drawing (16)
For number and length of sections, and typical details of inner tubes see Contract Drawing No 9

Approved
Consultants

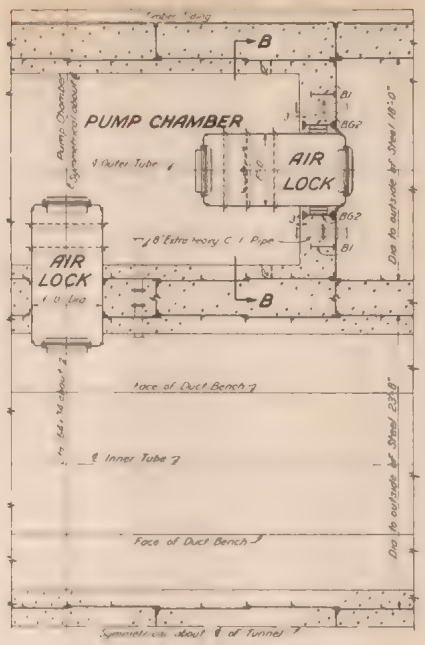
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 13

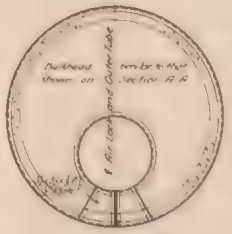
FILE Nº C4A

Drawn No 95
Traced No 96
Checked No 3-4

TYPICAL CONSTRUCTION - TRENCH PORTION
ALTERNATIVE PLAN 2



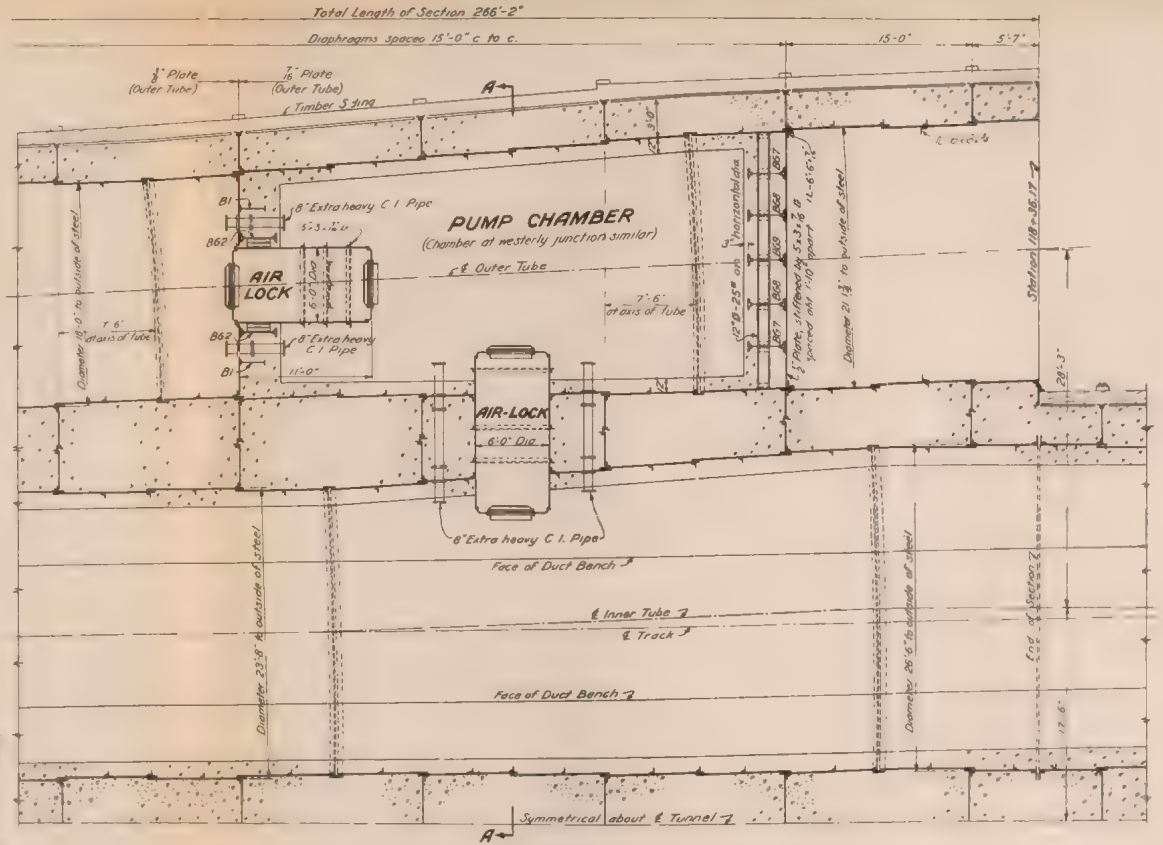
SECTIONAL PLAN
PUMP CHAMBER AT SUMMIT



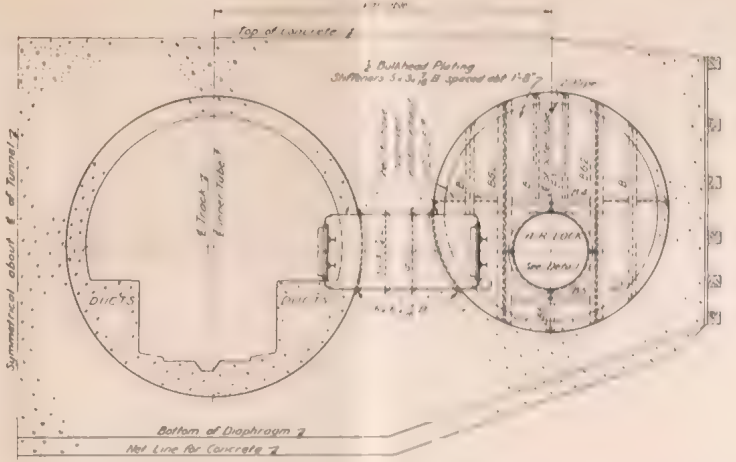
SECTION B-B

BEAM AND GIRDER SCHEDULE

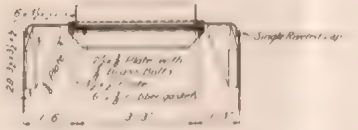
Mark	Nos.	Sections	Lengths
B1	4	I	9'0"
B62	1	PI 35 x ½	28'6"
			PI 16 x ½
B3	15	I	4'2 9"
B4	24	I	7'9"
B5		do	
B6		do	
B67	1	PI 36 x ½	20'6"
			PI 10 x ½
B68	1	PI 36 x ½	18'6"
			PI 8 x ½
B69	1	PI 36 x ½	20

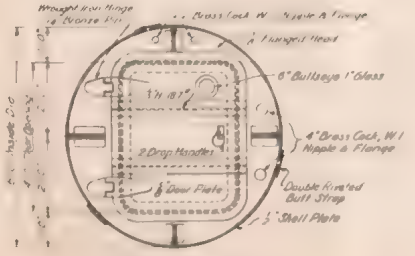


SECTIONAL PLAN
PUMP CHAMBER AT EASTERLY JUNCTION



SECTION A-A




Wrought Iron Hinge & Bronze Pin
Brass Lock W Handle & Thumpiece
½ Thumpiece Head
6" Bullseye 1" Glass
4" Brass Cock, W I Nipple & Flange
2 Drop Handles
℄ Door Plate
Double Riveted Butt Strap
⅝" Shell Plate

DETAIL OF AIR-LOCK

NOTES
Pump Chambers required in both north and south outer tubes of east and west junctions and at summit
All shell riveting to be made water tight
Caulking edges to be planed or barrel sheared

REFERENCE
For Index to Contract Plans, see Contract Drawing No. 1

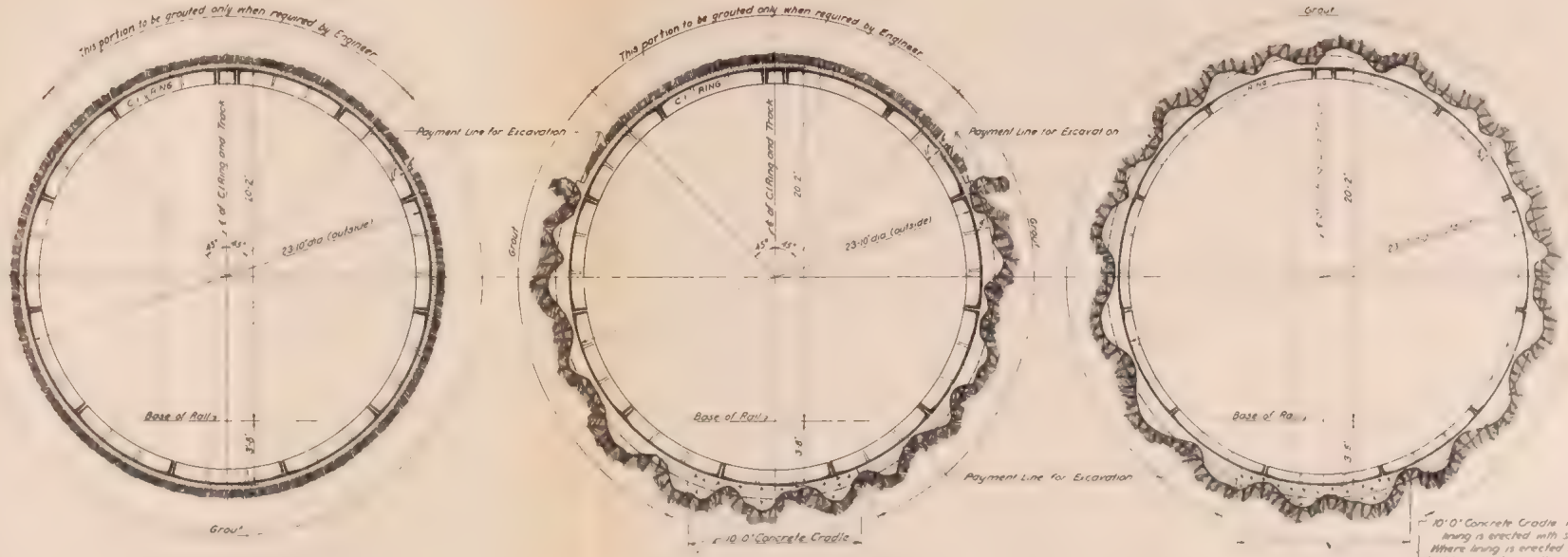
Approved
[illegible]
Town Engineer
Ralph Hobbs
Consultants
L. A. Woodard

BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 20

FILE Nº C4A

PUMP CHAMBERS IN OUTER TUBES, TRENCH PORTION
ALTERNATIVE PLAN 2


This portion to be grouted only when required by Engineer
C.I. RING
Payment Line for Excavation
Grout
Base of Rails
23'-10" dia (outside)
10'-0" Concrete Cradle
Grout
This portion to be grouted only when required by Engineer
C.I. RING
Payment Line for Excavation
Grout
Base of Rails
23'-10" dia (outside)
Payment Line for Excavation
10'-0" Concrete Cradle
Grout
Base of Rails
10'-0" Concrete Cradle where lining is erected with shield. Where lining is erected without shield, concrete cradle is to be carried up to horizontal diameter of tube, above which stone packing and grout are to be placed outside of C.I. Rings

SECTION IN EARTH

SECTION IN EARTH AND ROCK

SECTION IN ROCK

23'-10" DIA. CAST IRON TUNNEL

(UNLINED)

CONNECTIONS PORTION

REFERENCE
For Index of Contract Plans, see Contract Drawing No 1

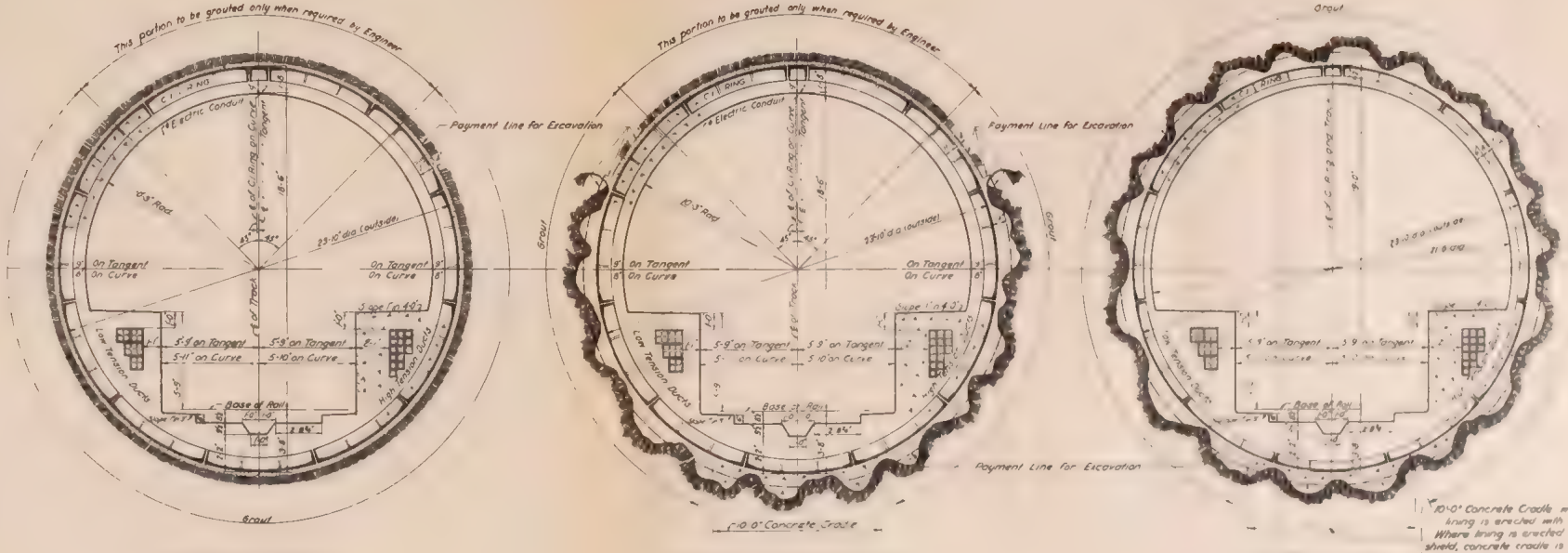
Approved
Consultants

BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 21

FILE Nº C4A



SECTION IN EARTH

SECTION IN EARTH AND ROCK

SECTION IN ROCK

10'-0" Concrete Cradle where lining is erected with shield. Where lining is erected without shield, concrete cradle is to be carried up to horizontal diameter of tube, above which stone packing and grout are to be placed outside of C.I. Ring.

NOTES

Sections are drawn looking Westward and apply to either Tube excepting Duct arrangement.
Ducts shewn in position for North Tube (Westbound).
Duct arrangement for South Tube (Eastbound) opposite hand

REFERENCES

For Index of Contract Plans, see Contract Drawing No. 1

23'-10" DIA. CAST IRON TUNNEL
(LINED)
CONNECTIONS PORTION

Approved

Consultants

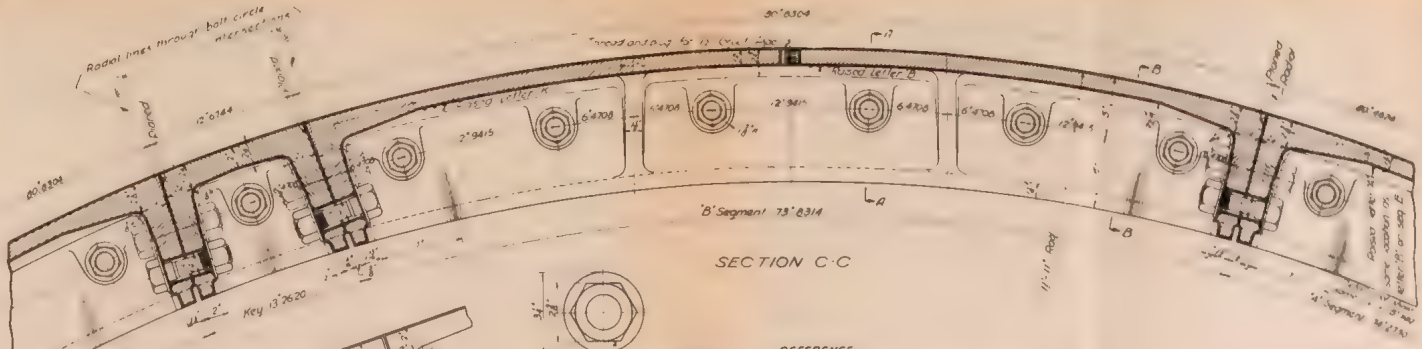
BOARD OF ESTIMATE AND APPORTIONMENT

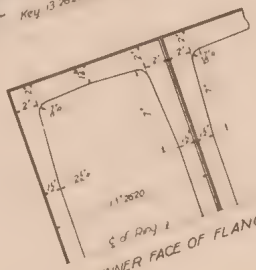
THE NARROWS TUNNEL

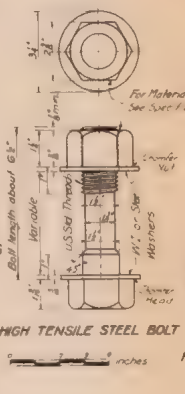
CONTRACT Nº 4A
CONTRACT DRAWING Nº 22

FILE Nº C4A

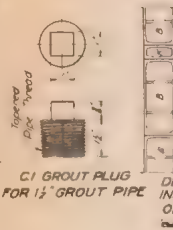
Drawn H.S.
Traced H.S.
Checked J.H. WEBB.

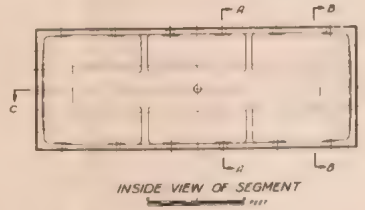


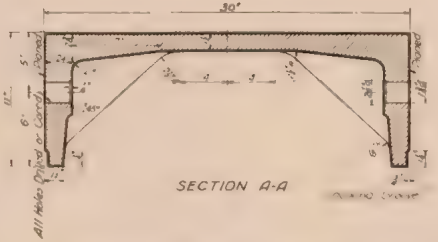


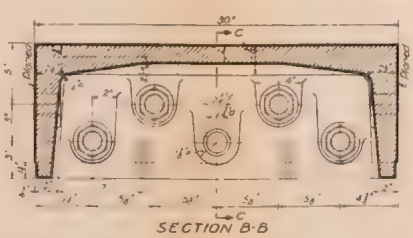


REFERENCE
For Index of Contract Plans see Contract Drawing No.1









Notes
Each ring consists of 11, 28 & 9A segments
Special segments and taper rings to be provided as required. Taper to be formed by varying the 10" mean dimension.
Cast steel tunnel rings, if required by the Engineer, shall conform to the details on this sheet

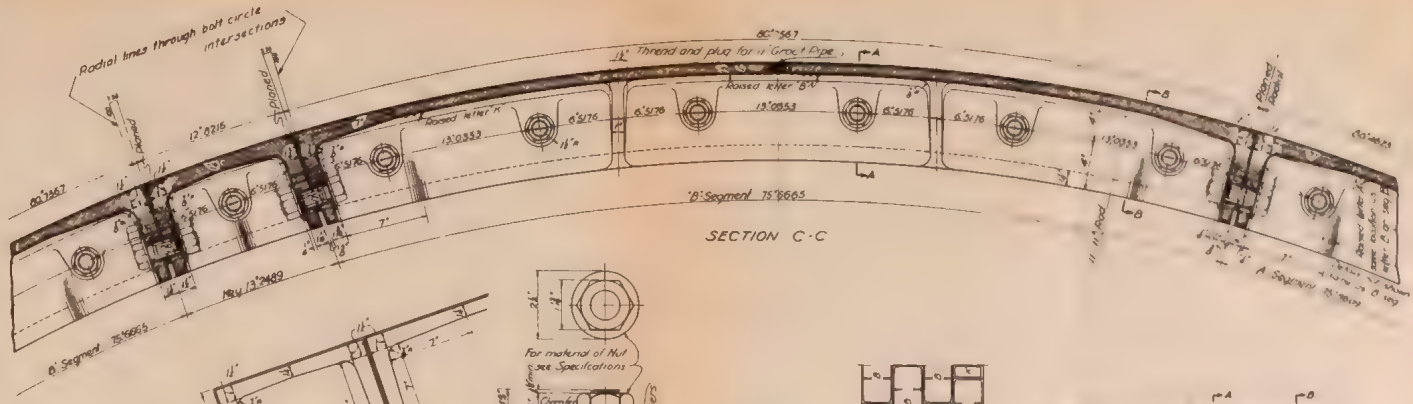
Approved
Consulting Engineers

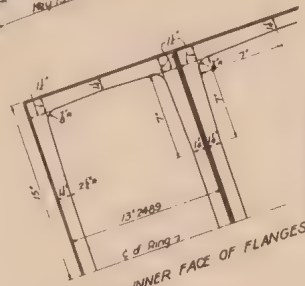
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

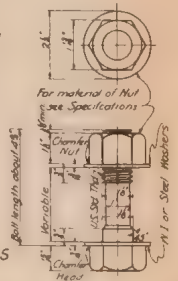
THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 23

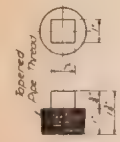
FILE Nº C 4A

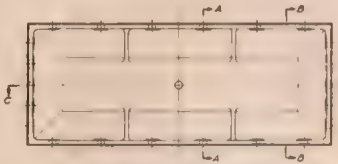
DETAILS OF 23'-10" DIA C.I. TUNNEL RING IN EARTH AND IN EARTH & ROCK


Radial lines through bolt circle intersections
Thread and plug for 1½" Grout Pipe
Raised letter 'B'
Raised letter 'A'
'B' Segment 15'-8665
SECTION C-C

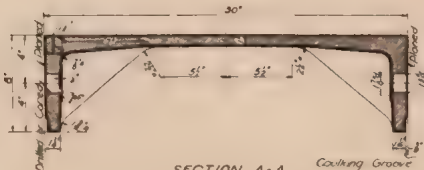


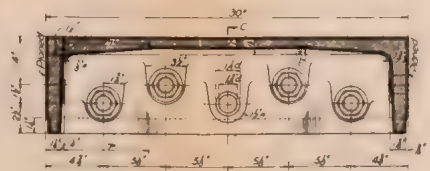






REFERENCE
For Index of Contract Plans see Contract Drawing No 1.





Notes:
Each ring consists of 1-'A', 2-'B' and 9-'A' segments
Special segments and taper rings to be provided as required. Taper to be formed by varying 30" web dimension

DETAILS OF 23'-10" DIA. C.I. TUNNEL RING IN ROCK

Drawn by
Traced by
Checked J.H.d WHEC.

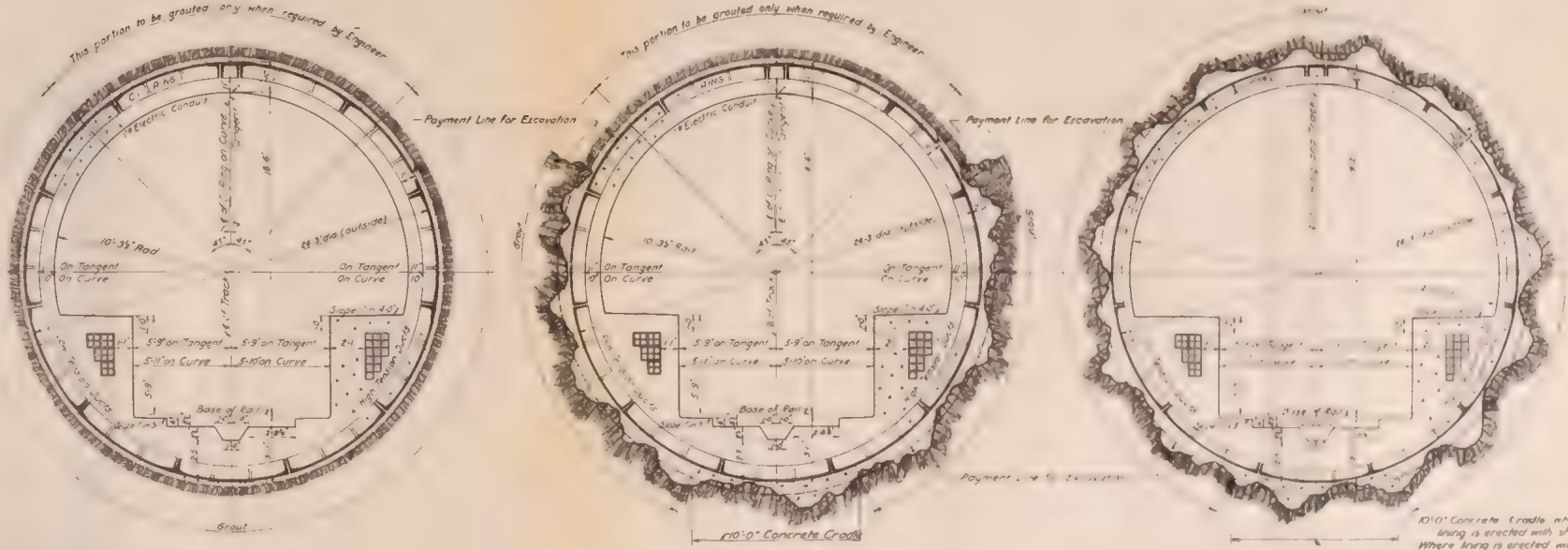
Approved
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL

CONTRACT No 4 A
CONTRACT DRAWING No 24

FILE No C 4 A



SECTION IN EARTH

SECTION IN EARTH AND ROCK

SECTION IN ROCK

10'-0" Concrete Cradle where lining is erected with shield. Where lining is erected without shield, concrete cradle is to be [illegible] after of Tube, above which stone packing and grout are to be placed outside of C.I. Ring

NOTES
Sections are drawn looking Westward and apply to either Tube excepting Duct arrangement.
Ducts shown in position for North Tube (Westbound).
Duct arrangement for South Tube (Eastbound) opposite hand.

REFERENCE:
For Index of Contract Plans see Contract Drawing No. 1.

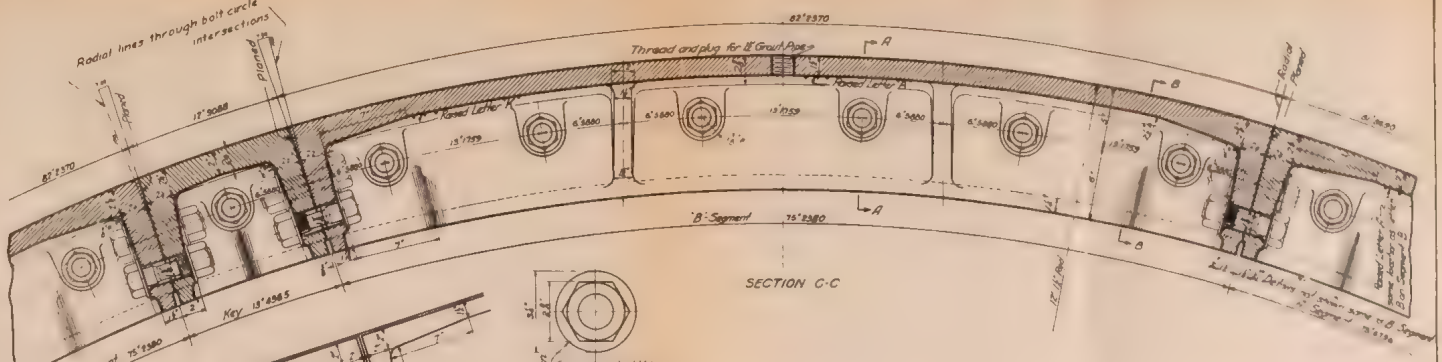
24'-3" DIA. CAST IRON TUNNEL
CONNECTIONS PORTION

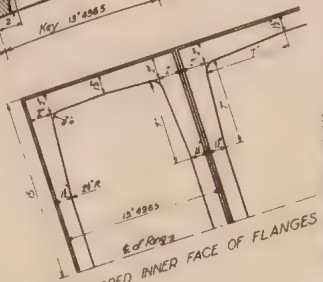
Consultants

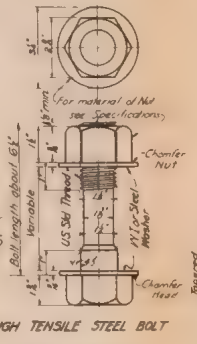
BOARD OF ESTIMATE AND APPORTIONMENT

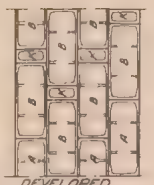
THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 38

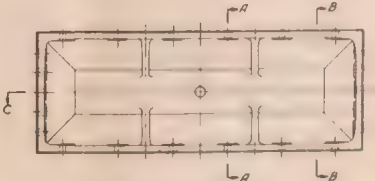
FILE Nº C 4A


Radial lines through bolt circle intersections
Thread and plug for 1½" Grout Pipe
Key 13'4965
B Segment 75'2380
SECTION C-C

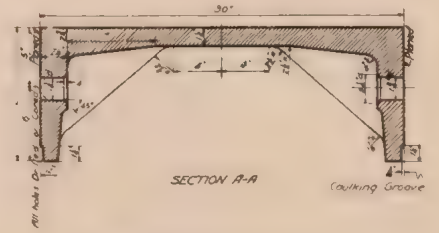


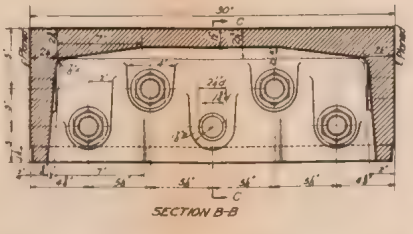






REFERENCE:
For Index of Contract Plans see Contract Drawing No. 1.





Notes
Each ring consists of 1-K" 7-B & 9-A segments
Special segments and taper rings to be provided as required "Taper" to be formed by varying the 30° web dimension
Cast steel tunnel rings, if required by the Engineer, shall conform to the details on this sheet

Approved
Consultants

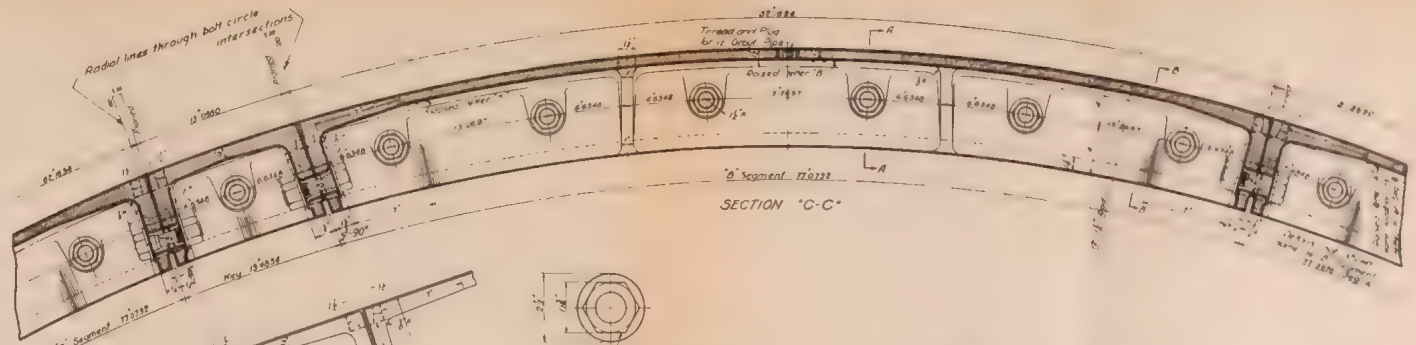
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT

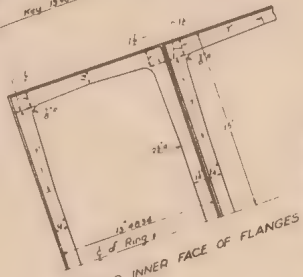
THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 28

FILE No C4A

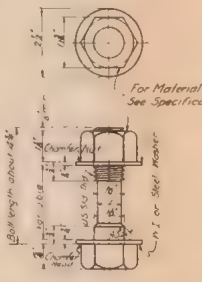
DETAILS OF 24' 3" DIA C.I. TUNNEL RING IN EARTH AND IN EARTH & ROCK

Drawn
Traced
Checked

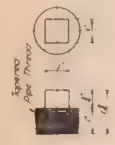




DEVELOPED INNER FACE OF FLANGES

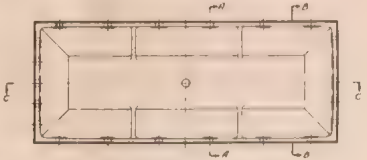


HIGH TENSILE STEEL BOLT



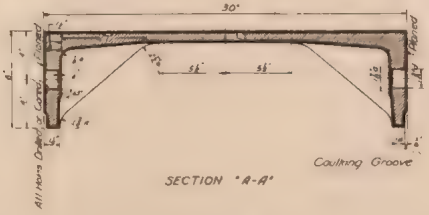
CI GROUT PLUG FOR 1½" GROUT PIPE

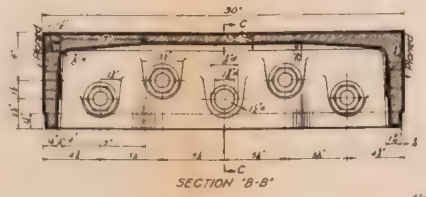
DEVELOPED INSIDE VIEW OF RINGS



INSIDE VIEW OF SEGMENT

REFERENCE
For Index of Contract Plans
see Contract Drawing No. 1.





TUNNEL RING
See Dwg. No 23

Notes
Each ring consists of 1-'H', 2-'B' & 9-'A' segments
Special segments and taper rings to be provided as required. Taper is to be formed by varying the 30" web dimension

Approved
Consultants

BOARD OF ESTIMATE AND APPORTIONMENT

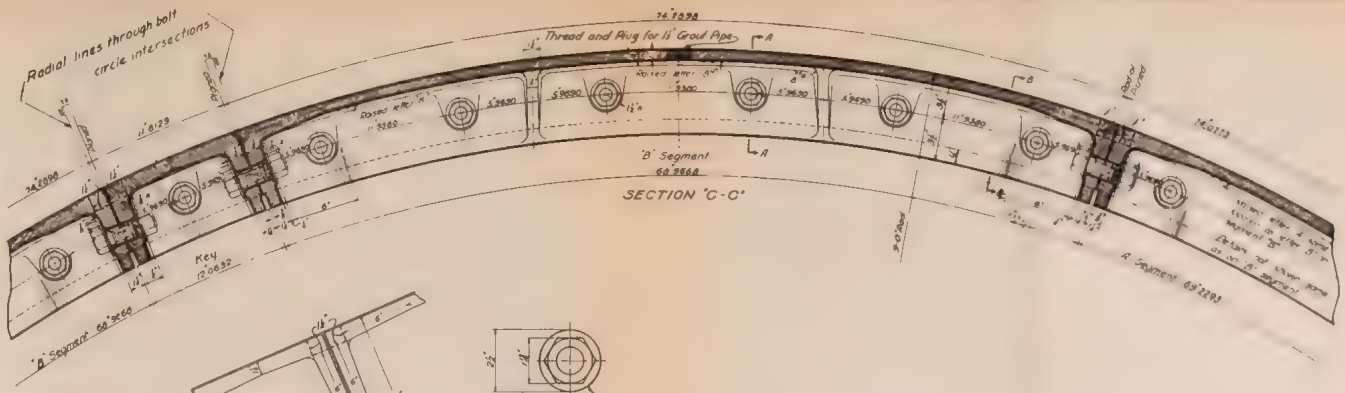
THE NARROWS TUNNEL

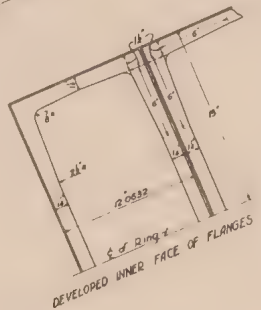
CONTRACT No 4 A
CONTRACT DRAWING No 27

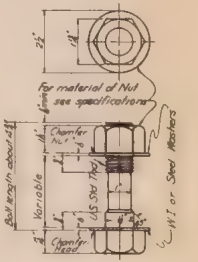
FILE N° C 4 A

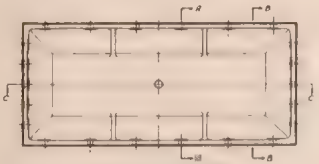
DETAILS OF 24'-3" DIA. C.I. TUNNEL RING IN ROCK

Drawn D.J.B
Traced
Checked

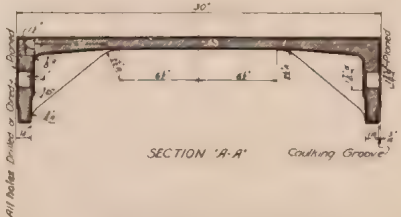


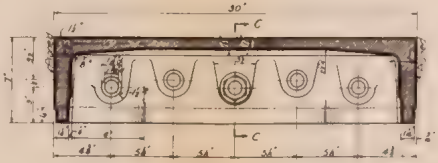






REFERENCE:
For Index of Contract Plans see Contract Drawing No. 1.





DETAILS OF 18'-0" DIA. C.I. TUNNEL RING

Notes
Each ring consists of 14 'A', 2 'B' and 2 'A' segments
Special segments and taper rings to be provided as required. Taper to be formed by varying the 30" web dimension.
Cast steel tunnel rings if required by the Eng. shall conform to the details on this sheet

Approved
Consultants

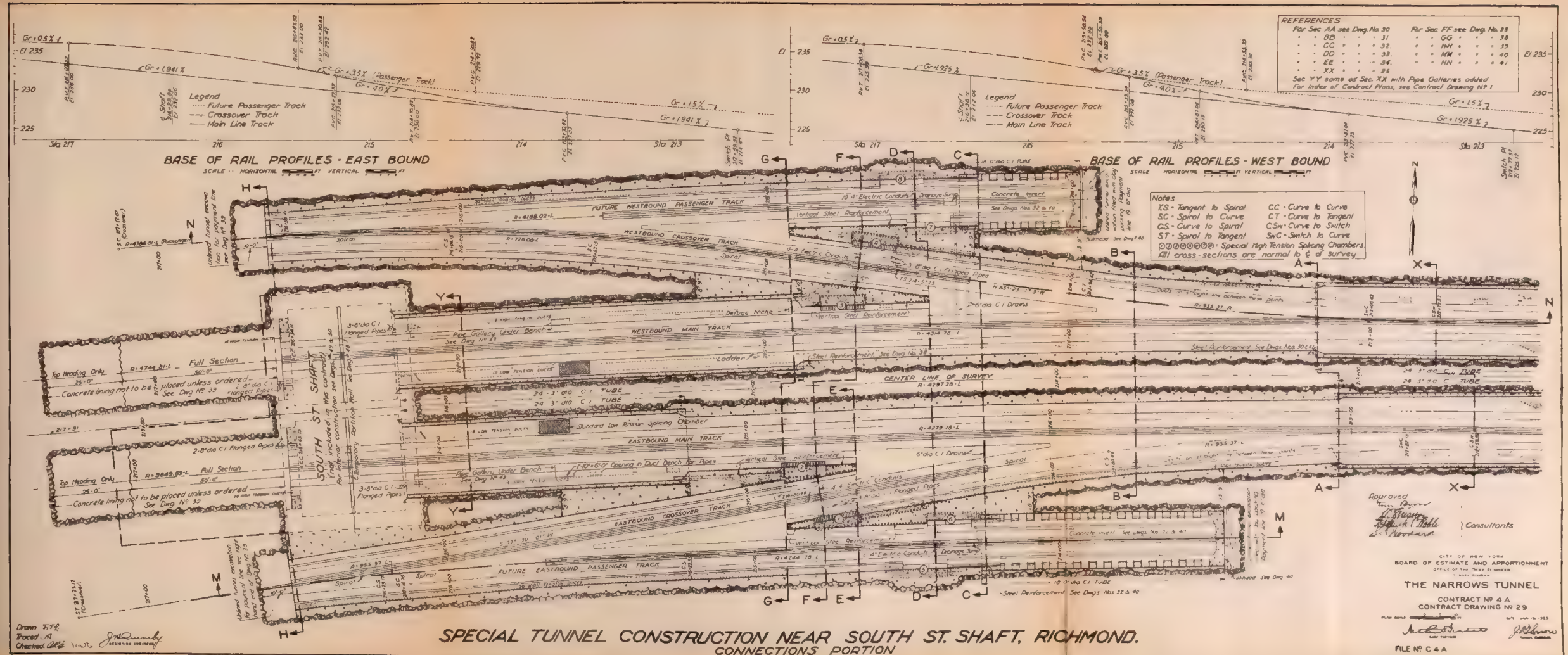
BOARD OF ESTIMATE AND APPORTIONMENT

THE NARROWS TUNNEL

CONTRACT No 4 A
CONTRACT DRAWING No 28

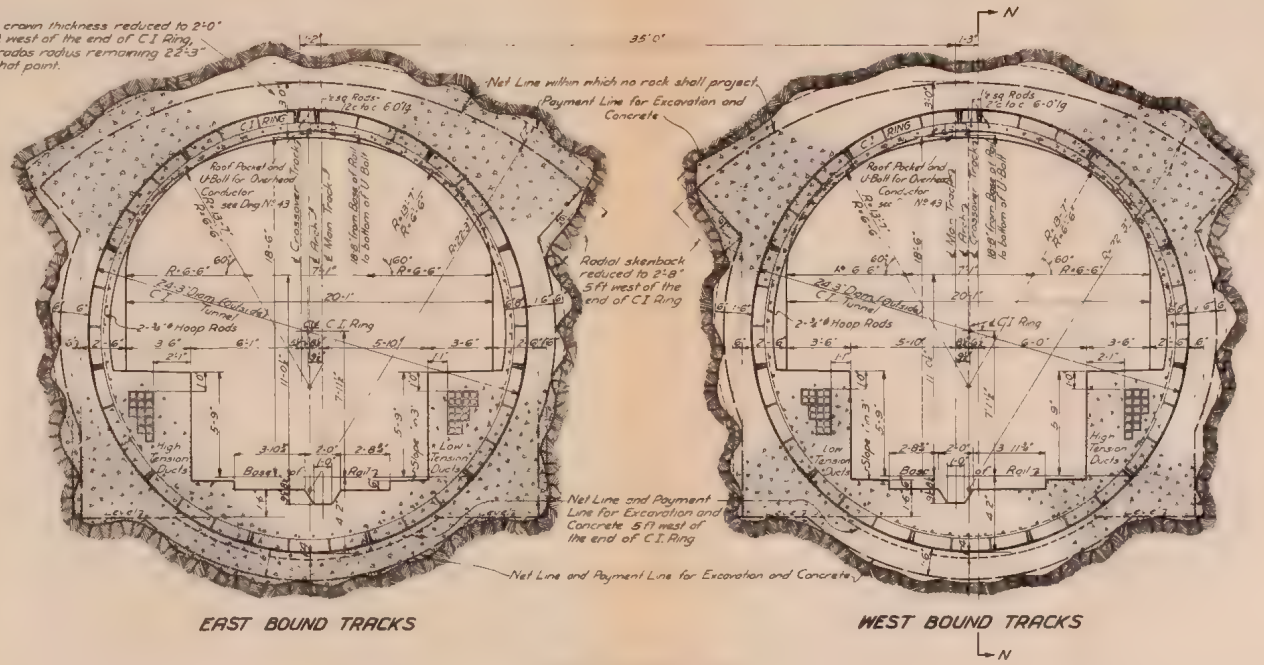
FILE No C 4 A

Drawn
Traced
Checked



SPECIAL TUNNEL CONSTRUCTION NEAR SOUTH ST. SHAFT, RICHMOND.

CONNECTIONS PORTION


Net crown thickness reduced to 2'-0" 5 ft. west of the end of C.I. Ring, Extrados radius remaining 22'-3" at that point.
35'-0"
Net Line within which no rock shall project
Payment Line for Excavation and Concrete
C.I. RING
Roof Pocket and U-Bolt for Overhead Conductor see Drg. N° 43
Radial skewback reduced to 2'-8" 5 ft west of the end of C.I. Ring
2-¾" ø Hoop Rods
C.I. Ring
High Tension Ducts
Low Tension Ducts
Base of Rail
Net Line and Payment Line for Excavation and Concrete 5 ft west of the end of C.I. Ring
Net Line and Payment Line for Excavation and Concrete
N
EAST BOUND TRACKS
WEST BOUND TRACKS

SECTION A-A
(STATION 213+11±)

NOTES:
Payment Lines and Excavation Lines of Section A-A apply for a distance of 5 ft. each side of the end of the C.I. Ring (see Drg. N° 41)
At Switch Points C.I. Rings are in their normal position with relation to Base of Rail and ℄ Main Track (see Drg N° 25)

REFERENCES
For Index of Contract Plans, see Contract Drawing N°
" Section "N-N" see Contract Drawing N° 41

Approved
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

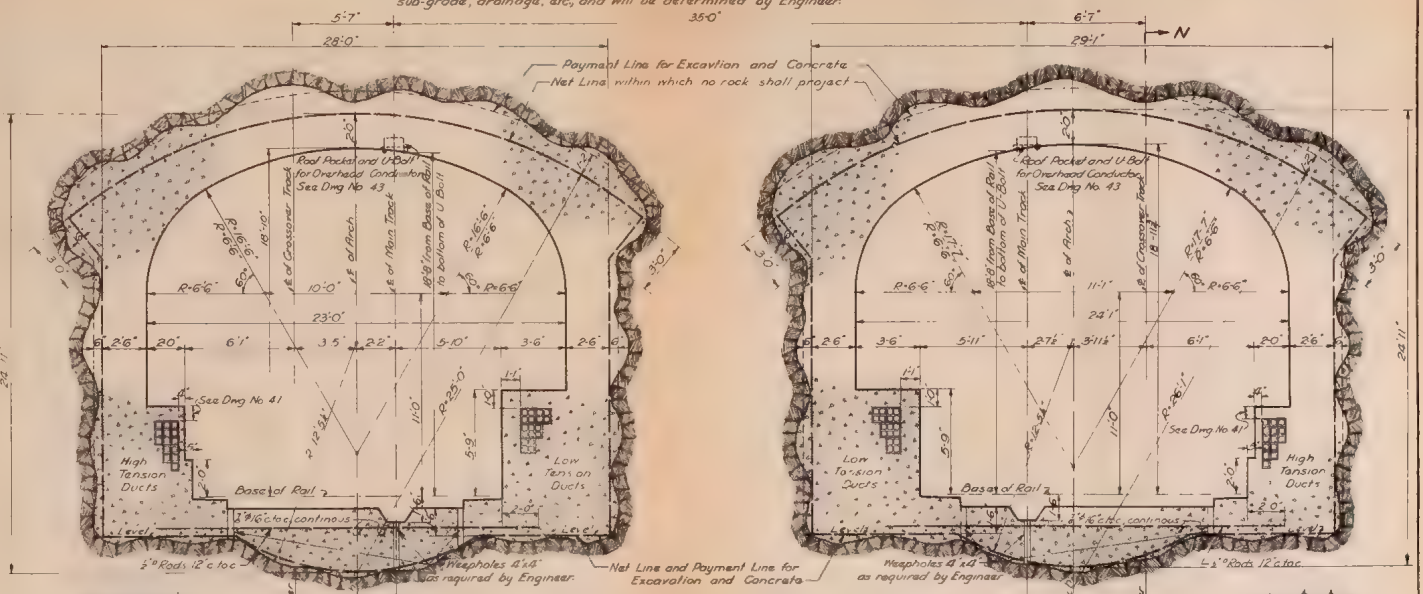
CONTRACT N° 4A
CONTRACT DRAWING N° 30

SCALE 1" = 1'-0" DATE JAN 5 1939

FILE N° C 4A

NOTES

Tunnel Invert will be built to lines indicated as Alternative No.1 unless otherwise directed
The use of Tunnel Invert as shown on Alternative No.2 will depend upon conditions of sub-grade, drainage, etc, and will be determined by Engineer.


Payment Line for Excavation and Concrete
Neat Line within which no rock shall project
Roof Pocket and U-Bolt for Overhead Conductor See Dwg No. 43
See Dwg No. 41
High Tension Ducts
Low Tension Ducts
Base of Rail
Weepholes 4"x4" as required by Engineer
Neat Line and Payment Line for Excavation and Concrete
ALTERNATIVE No 1
ALTERNATIVE No 2
Details and dimensions not shown, same as Alternative No 1
EASTBOUND TRACKS
WESTBOUND TRACKS

REFERENCES:
For Index of Contract Plans, see Contract Drawing No 1.
" Section 'N-N' see Contract Drawing No 41.

SECTION B-B
(STATION 213+75 ±)

Approved:
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

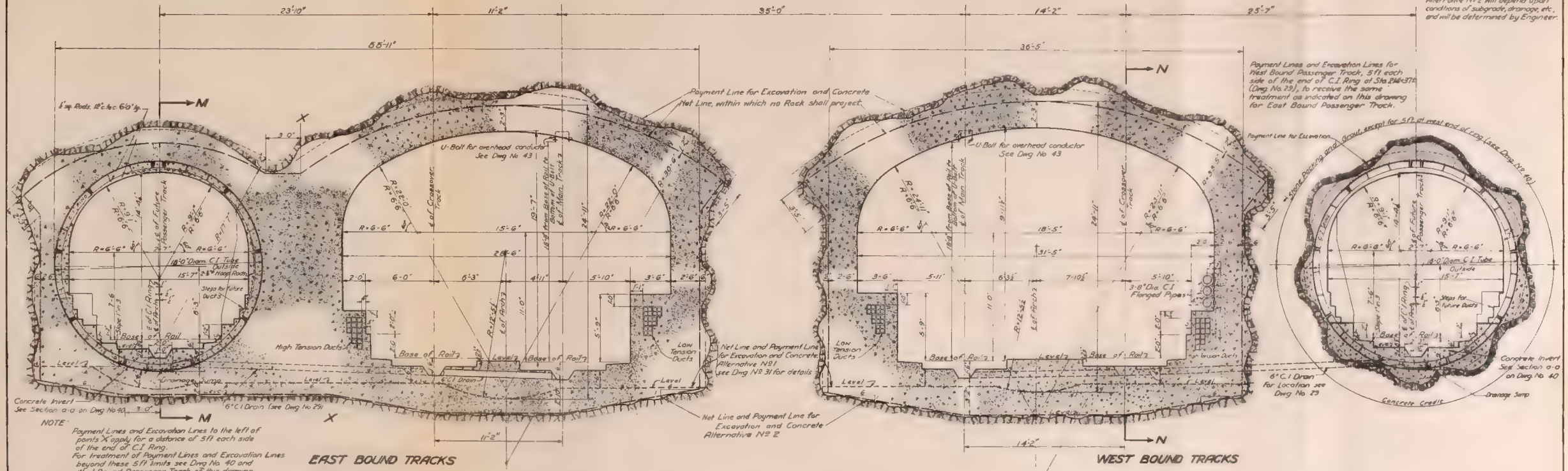
CONTRACT No 4A
CONTRACT DRAWING No 31

DATE JAN 6, 1928

FILE No C4A

Drawn F.J.R
Traced F.J.R
Checked C.M.B. W.S.C.
DESIGNING ENGINEER

NOTES: Tunnel invert will be built to lines indicated as Alternative N°1 unless otherwise directed.
The use of tunnel invert as shown on Alternative N° 2 will depend upon conditions of subgrade, drainage, etc., and will be determined by Engineer.


23'-10"
11'-2"
35'-0"
65'-11"
5/8" sq. Rods, 12" c. to c. 60° Sp.
M
X
3'-0"
Payment Line for Excavation and Concrete Net Line, within which no Rock shall project.
U-Bolt for overhead conductor See Dwg No 43
℄ of Crossover Track
℄ of Future Passenger Track
R=6'-6"
R=6'-0"
R=22'-0"
R=12'-5"
18'-0" Diam. C.I. Tube Outside
15'-7"
28" Hoop Rods
Steps for future Ducts
Base of Rail
Level
Drainage Tube
6" C.I. Drain (see Dwg No 29)
Concrete Invert See Section a-a on Dwg No 40
High Tension Ducts
Low Tension Ducts
℄ of Arch
Net Line and Payment Line for Excavation and Concrete Alternative N° 1 (see Dwg N° 31 for details)
Net Line and Payment Line for Excavation and Concrete Alternative N° 2
EAST BOUND TRACKS
36'-5"
14'-2"
25'-7"
3-8" Dia. C.I. Flanged Pipes
6" C.I. Drain For Location see Dwg No 29
WEST BOUND TRACKS
Payment Lines and Excavation Lines for West Bound Passenger Track, 5 ft. each side of the end of C.I. Ring at Sta. 214+37½ (Dwg. No. 29), to receive the same treatment as indicated on this drawing for East Bound Passenger Track.
Payment Line for Excavation
Stone Packing and Grout, except for 5 ft. at west end of ring (see Dwg. N° 40)
Concrete Invert See Section a-a on Dwg. No. 40
Concrete Cradle
Drainage Sump

NOTE:
Payment Lines and Excavation Lines to the left of points X apply for a distance of 5 ft. each side of the end of C.I. Ring.
For treatment of Payment Lines and Excavation Lines beyond these 5 ft. limits see Dwg No. 40 and West Bound Passenger Track of this drawing.

REFERENCES
For Index of Contract Plans, see Contract Drawing N° 1.
" Section "M-M" see Contract Drawing N° 40
" " "N-N" " " " " 41

SECTION C-C
(STATION 214+25 ±)

Approved:
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

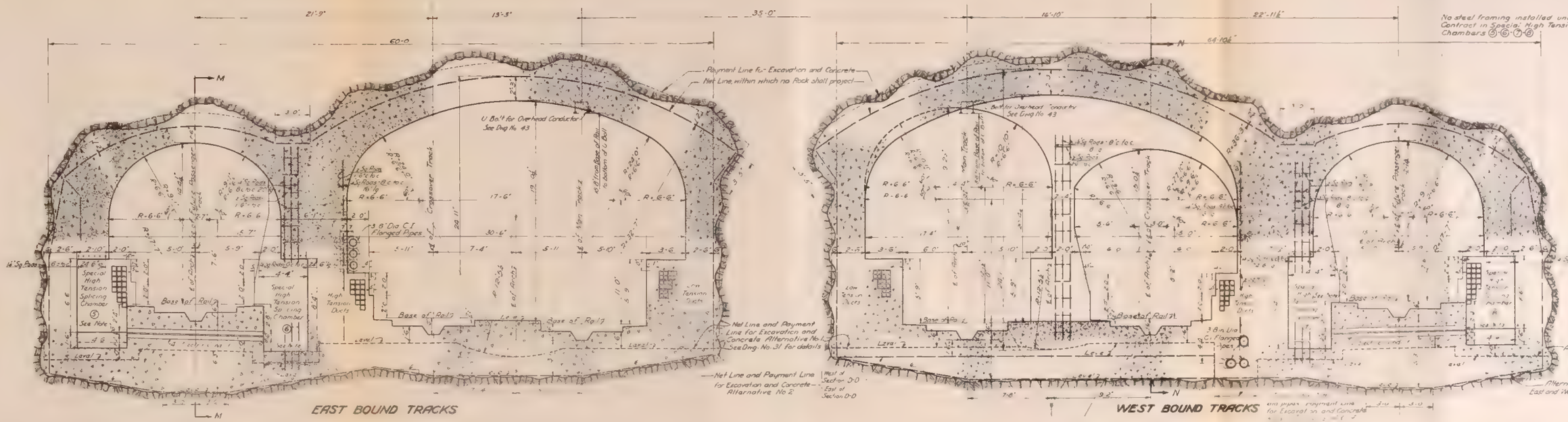
THE NARROWS TUNNEL
CONTRACT N° 4 A
CONTRACT DRAWING N° 32

FILE N°C 4A

Drawn F.N.G.
Traced
Checked

NOTES
Tunnel Invert will be built to lines indicated as Alternative No 1 unless otherwise directed. The use of Tunnel Invert as shown on Alternative No 2 will depend upon conditions of sub-grade, drainage, etc, and will be determined by Engineer

No steel framing installed under this Contract in Special High Tension Splicing Chambers ③-⑥-⑦-⑧


Payment Line for Excavation and Concrete
Net Line, within which no Rock shall project
U Bolt for Overhead Conductor See Dwg No 43
Crossover Track
Main Tracks
Special High Tension Splicing Chamber ③ See Note
Special High Tension Splicing Chamber ⑥
High Tension Ducts
Base of Rail
Level
Net Line and Payment Line for Excavation and Concrete Alternative No 1 See Dwg. No. 31 for details
Net Line and Payment Line for Excavation and Concrete Alternative No 2
West of Section D-D
East of Section D-D
Bonding Jumper Connection See Dwg No 43
Low Tension Ducts
3 Bin Via C.I. Flanged Pipes
Alternative No 1
Alternative No 2
East and West of Section D-D
EAST BOUND TRACKS
WEST BOUND TRACKS

REFERENCES
For Index of Contract Plans, see Contract Drawing No 1
" Section "M-M" see Contract Drawing No 40
" " "N-N" " " 41

SECTION D-D
(STATION 214+42±)

Approved

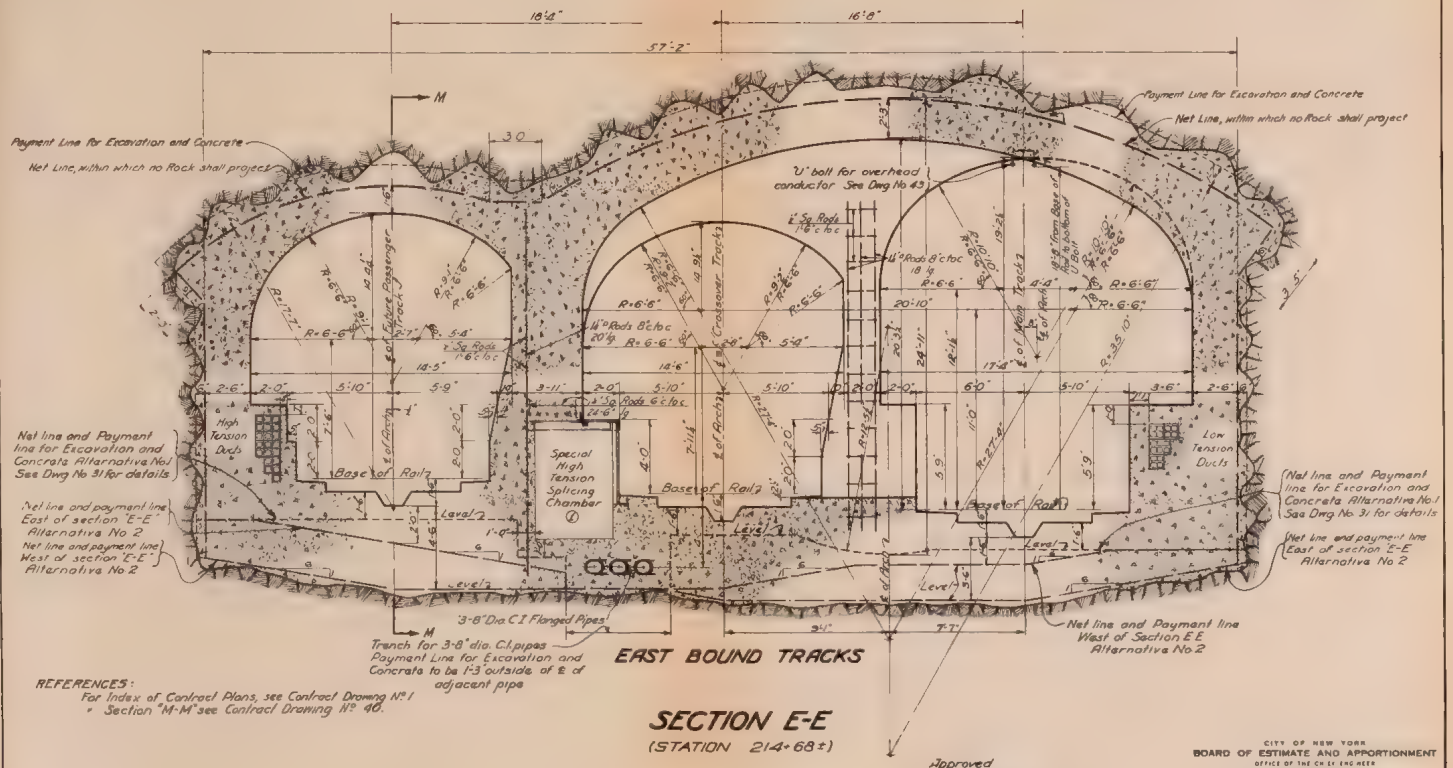
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 33

FILE No C4A

NOTES:
Tunnel Invert will be built to lines indicated as Alternative No.1 unless otherwise directed.
The use of Tunnel Invert as shown on Alternative No 2 will depend upon conditions of sub-grade, drainage, etc., and will be determined by Engineer.


18'-4"
16'-8"
57'-2"
M
Payment Line for Excavation and Concrete
Net Line, within which no Rock shall project
30
"U" bolt for overhead conductor See Dwg No 43
Payment Line for Excavation and Concrete
Net Line, within which no Rock shall project
Future Passenger Track
Crossover Tracks
West Bound Tracks
High Tension Ducts
Low Tension Ducts
Special High Tension Splicing Chamber
Base of Rail
Level
Net line and Payment line for Excavation and Concrete Alternative No.1 See Dwg No 31 for details
Net line and payment line East of section "E-E" Alternative No 2
Net line and payment line West of section "E-E" Alternative No 2
3'-8" Dia C.I Flanged Pipes
Trench for 3'-8" dia. C.I. pipes Payment Line for Excavation and Concrete to be 1'-3 outside of ℄ of adjacent pipe
Net line and Payment line West of Section E.E Alternative No 2
EAST BOUND TRACKS

REFERENCES:
For Index of Contract Plans, see Contract Drawing No 1
" Section "M-M" see Contract Drawing No 40.

SECTION E-E
(STATION 214+68±)

Approved
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT No 4A
CONTRACT DRAWING No 34

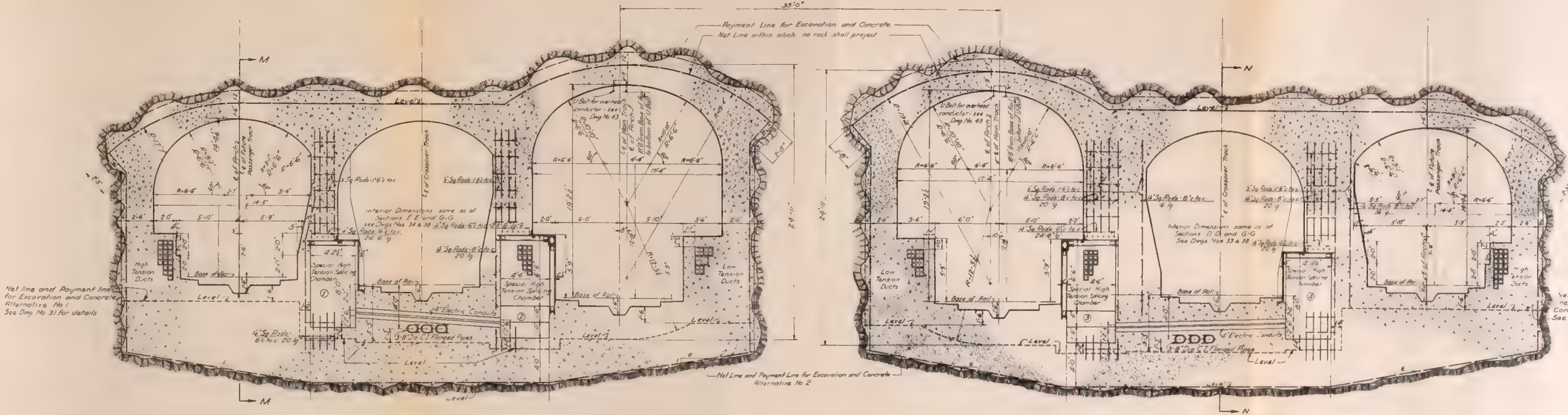
SCALE 1" = 1 FEET DATE JAN 15 1925

FILE No C 4A

Drawn A.R.G
Traced No d.g
Checked G.R.S WHR

DESIGN RD ENGINEER

NOTES:
Tunnel Invert will be built to lines indicated as Alternative No.1 unless otherwise directed. The use of Tunnel Invert as shown on Alternative No.2 will depend upon conditions of sub-grade, drainage, etc, and will be determined by Engineer.


35'-0"
Payment Line for Excavation and Concrete
Net Line within which no rock shall project
M
N
Level
4 of Arch
4 of Future Passenger Track
4 of Crossover Track
4 of Main Track
U Bolt for overhead conductor - see Dwg No. 43
8'-6" from Base of Rail to Bottom of U Bolt
Interior Dimensions same as at Sections E-E and G-G see Dwgs Nos. 34 & 38
4 Sq Rods-8'c to c 20'-9"
4 Sq Rods-8'c to c 24'-6"
4 Sq Rods-8'c to c 6'-9"
4 Sq Rods-16'c to c
Special High Tension Splicing Chamber
Base of Rail
Low Tension Ducts
High Tension Ducts
4" Electric Conduits
3-8" Dia C.I. Flanged Pipes
Net line and Payment line for Excavation and Concrete Alternative No.1 See Dwg No. 31 for details
Net Line and Payment Line for Excavation and Concrete Alternative No. 2
24'-11"
EAST BOUND TRACKS
WEST BOUND TRACKS

SECTION F-F
(STATION 214+74±)

REFERENCES:
For Index of Contract Plans, see Contract Drawing No. 1
" Section "M-M" see Contract Drawing No. 40.
" " "N-N" " " " " 41

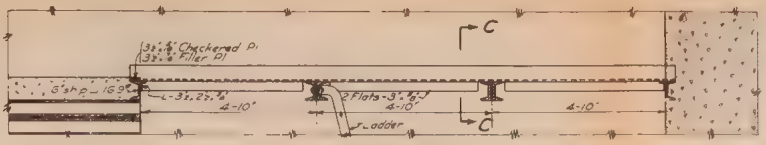
Approved:
Tunnel Board
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL BUREAU

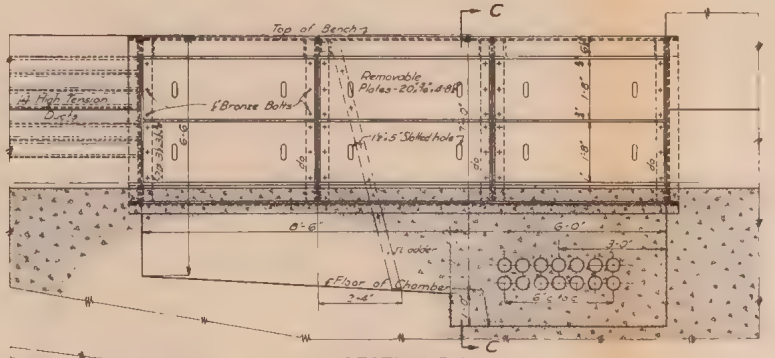
THE NARROWS TUNNEL
CONTRACT No. 4A
CONTRACT DRAWING No. 35

FILE No. C 4A

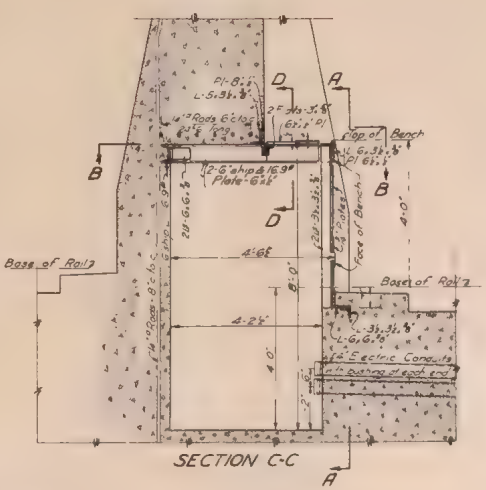
Drawn A.G.
Traced H.S. & F.I.B.
Checked J.M.F. & W.E.S.



SECTION D D

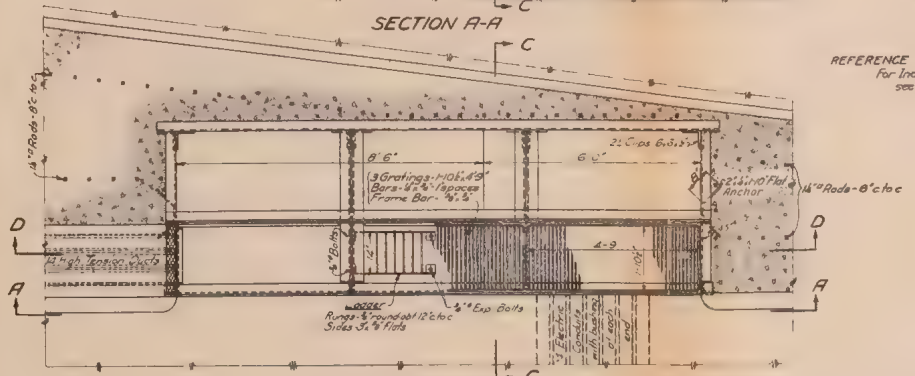


SECTION A-A



SECTION C-C

REFERENCE
For Index of Contract Plans,
see Contract Drawing No. 1.



HORIZONTAL SECTION B-B

SPECIAL HIGH TENSION SPLICING CHAMBERS ① AND ④

DETAILS HERE SHOWN APPLY TO CHAMBER ①. CHAMBER ④ OPPOSITE HAND BUT OTHERWISE IDENTICAL WITH CHAMBER ①
EXCEPTING OUTLINE OF PIER AND VERTICAL REINFORCEMENT AS PER DWG. Nº 29

Drawn D.H.
Traced A.T.
Checked H.F.K.

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

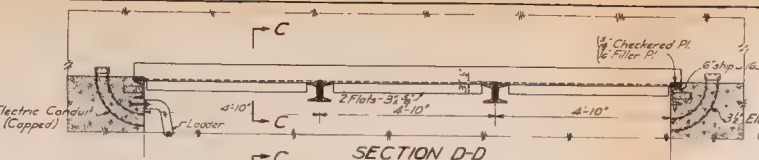
THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 36

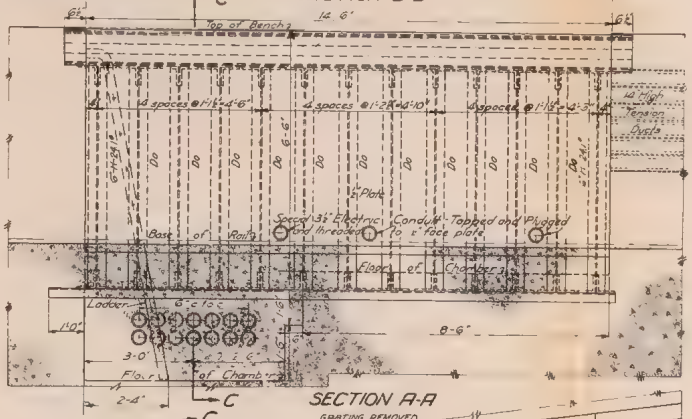
SCALE 3" = 1 FOOT DATE JAN 13, 1922

CHIEF ENGINEER TUNNEL ENGINEER

FILE Nº C4A

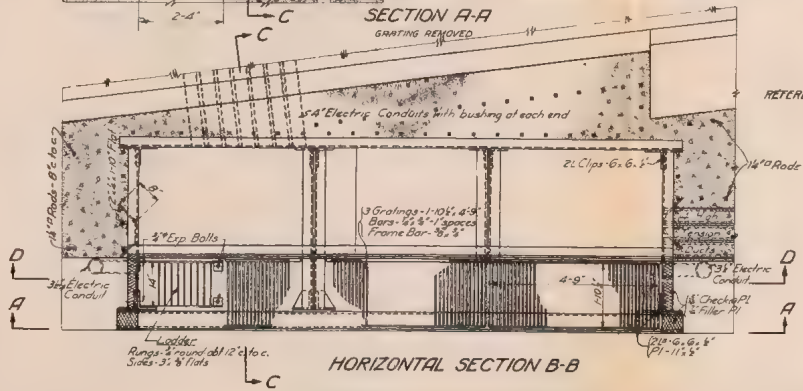


SECTION D-D



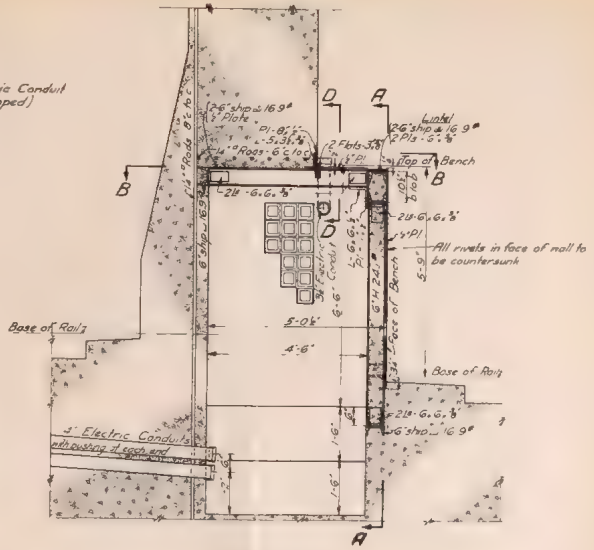
SECTION A-A

GRATING REMOVED


C
4 - 4" Electric Conduits with bushing at each end
¼" Rods - 6'-6" to c
2 L Clips - 6 x 6 x ⅝"
¼" Rods - 8'-6" to c
3 Gratings - 1'-10½" x 4'-9"
Bars - 6½" x ⅝" - 1" spaces
Frame Bar - 8" x ⅝"
¾" Exp. Bolts
D
A
3½" Electric Conduit
4'-9"
3½" Electric Conduit
⅝" Checker Pl.
⅝" Filler Pl.
A
D
Ladder
Rungs - ¾" round obl 12" c to c
Sides - 3" x ⅜" flats
C
(2) 2½" x 6" x 6" x ⅝"
(Pl - 11" x ⅝")

HORIZONTAL SECTION B-B

REFERENCE:
For Index of Contract Plans, see Contract Drawing No. 1.



SECTION C-C

GRATINGS REMOVED

SPECIAL HIGH TENSION SPLICING CHAMBERS ② AND ③

DETAILS HERE SHOWN APPLY TO CHAMBER ②. CHAMBER ③ OPPOSITE HAND BUT OTHERWISE IDENTICAL WITH CHAMBER ② EXCEPTING OUTLINE OF PIER AND VERTICAL REINFORCEMENT #3 PER DWG NO 29.

Drawn A.W.
Traced A.W.
Checked 7/21/K WHBR. Joseph Rumbold DESIGNING ENGINEER

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT № 4 A
CONTRACT DRAWING № 37

SCALE 1" = 1 FOOT DATE JUNE 28, 1935

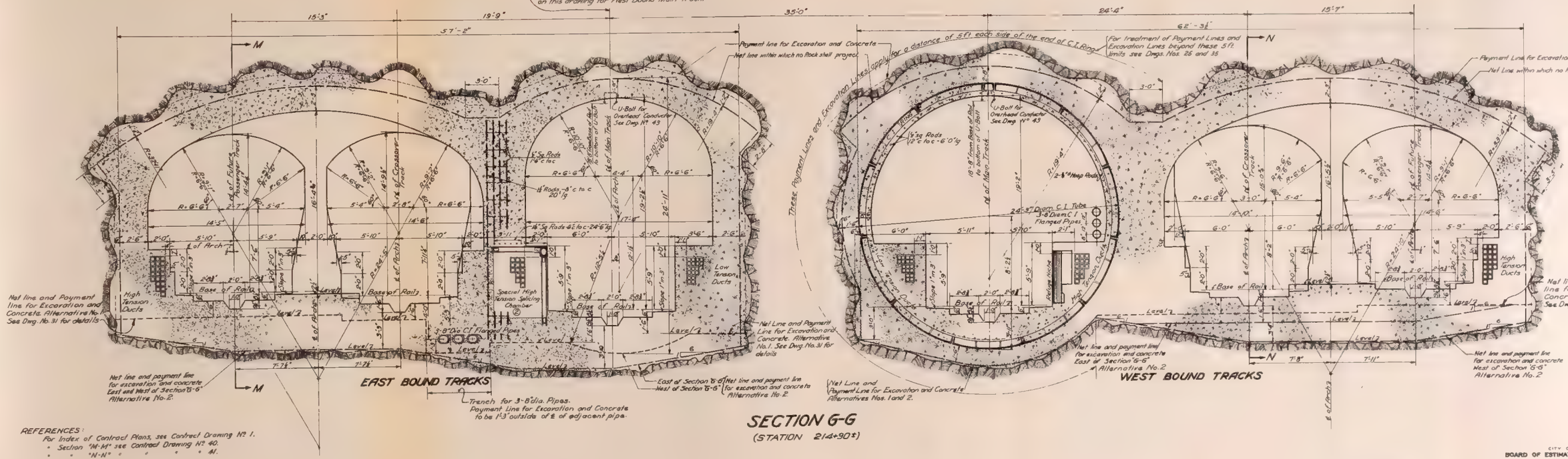
Jack Stevens CHIEF ENGINEER J. Rohm TUNNEL ENGINEER

FILE № C 4 A

M.B. BROWN PRINTING & BINDING CO., N.Y.

NOTE:
Payment Lines and Excavation Lines for East Bound Main Track, 5 Ft each side of the end of C.I. Ring at Sta. 215+94 (Dwg. No. 29) to receive the same treatment as indicated on this drawing for West Bound Main Track.

NOTES:
Tunnel Invert will be built to lines indicated as Alternative No.1 unless otherwise directed. The use of Tunnel Invert as shown as Alternative No.2 will depend upon conditions of sub-grade, drainage, etc, and will be determined by Engineer.


These Payment Lines and Excavation Lines apply for a distance of 5 Ft each side of the end of C.I. Rings
For treatment of Payment Lines and Excavation Lines beyond these 5 Ft. limits see Dwgs. Nos. 26 and 35
Payment line for Excavation and Concrete
Net line within which no Rock shall project
U-Bolt for Overhead Conductor See Dwg. No. 43
4 Sq Rods 12'-6" c to c - 6'-0" lg
2-8"ø Heap Rods
24'-3" Diam C.I. Tube
3-8 Diam C.I. Flanged Pipes
Net line and payment line for excavation and concrete East of Section 'G-G' Alternative No. 2
Net line and Payment Line for Excavation and Concrete Alternatives Nos. 1 and 2.
WEST BOUND TRACKS
Net line and Payment line for Excavation and Concrete. Alternative No. 1. See Dwg. No. 31 for details
Net line and payment line for excavation and concrete East and West of Section 'G-G' Alternative No. 2.
High Tension Ducts
Low Tension Ducts
Special High Tension Splicing Chamber
3-8'-0" C.I. Flanged Pipes
Trench for 3-8'dia. Pipes. Payment Line for Excavation and Concrete to be 1'-3" outside of ℄ of adjacent pipe.
EAST BOUND TRACKS
Net line and Payment Line for Excavation and Concrete Alternative No. 1. See Dwg. No. 31 for details
Net line and payment line for excavation and concrete East of Section 'G-G' Alternative No. 2
Net line and payment line for excavation and concrete West of Section 'G-G' Alternative No. 2
Net line and Payment Line for Excavation and Concrete Alternatives No. 1 and 2. See Dwg. No. 31 for details

SECTION G-G
(STATION 214+90±)

REFERENCES:
For Index of Contract Plans, see Contract Drawing No. 1.
" Section "M-M" see Contract Drawing No. 40
" " "N-N" " " " " 41.

Approved
Trinity
Consultants

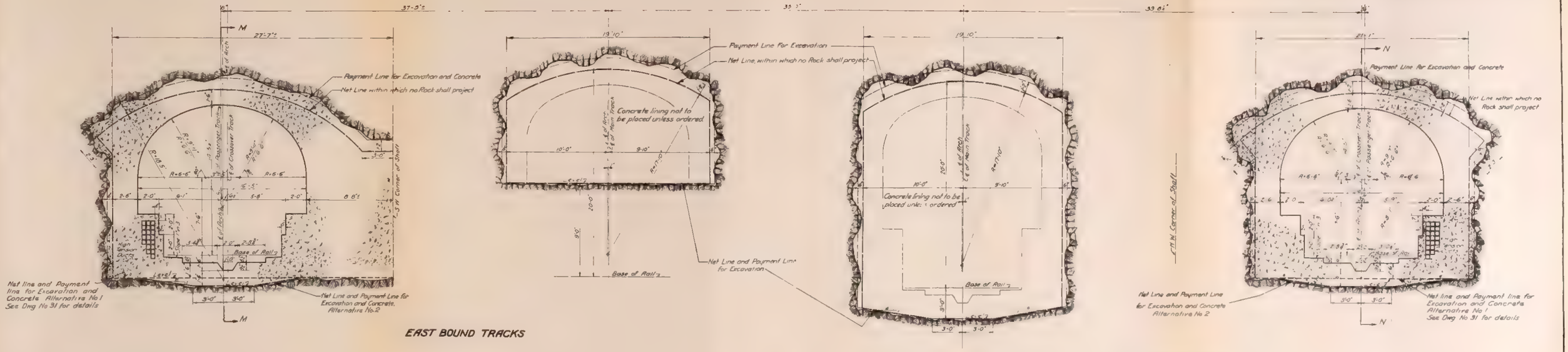
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 38

FILE No C4A

Drawn A.R.G.
Traced
Checked

NOTES
Tunnel Invert will be built to lines indicated as Alternative No.1 unless otherwise directed
The use of Tunnel Invert as shown on Alternative No.2 will depend upon conditions of sub-grade, drainage, etc, and will be determined by Engineer


37-5"±
27-7"±
M
Payment Line for Excavation and Concrete
Net Line within which no Rock shall project
Net line and Payment line for Excavation and Concrete Alternative No.1 See Dwg No 31 for details
Net Line and Payment Line for Excavation and Concrete, Alternative No.2
EAST BOUND TRACKS
19'10"
Payment Line For Excavation
Net Line, within which no Rock shall project
Concrete lining not to be placed unless ordered
Net Line and Payment Line for Excavation
Base of Rail
Concrete lining not to be placed unless ordered
WEST BOUND TRACKS
N
Payment Line for Excavation and Concrete
Net Line within which no Rock shall project
Net Line and Payment Line for Excavation and Concrete Alternative No.2
Net line and Payment line for Excavation and Concrete Alternative No.1 See Dwg No 31 for details

REFERENCES
For Index of Contract Plans see Contract Drawing No.1.
" Section M-M see Contract Drawing No. 40
" " N-N " " " " 41.

SECTION H-H
(WEST OF SOUTH ST SHAFT.

Drawn H.S.
Traced H.S.
Checked [illegible]

Approved
[illegible]
Consultants

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BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

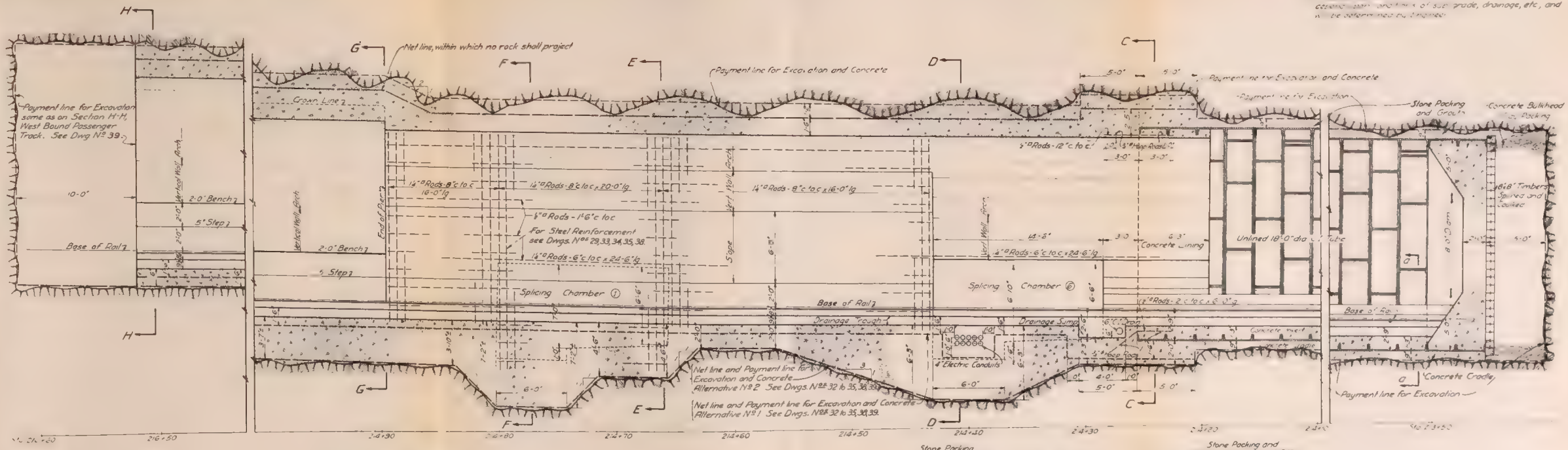
THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 33

FILE No C 4A

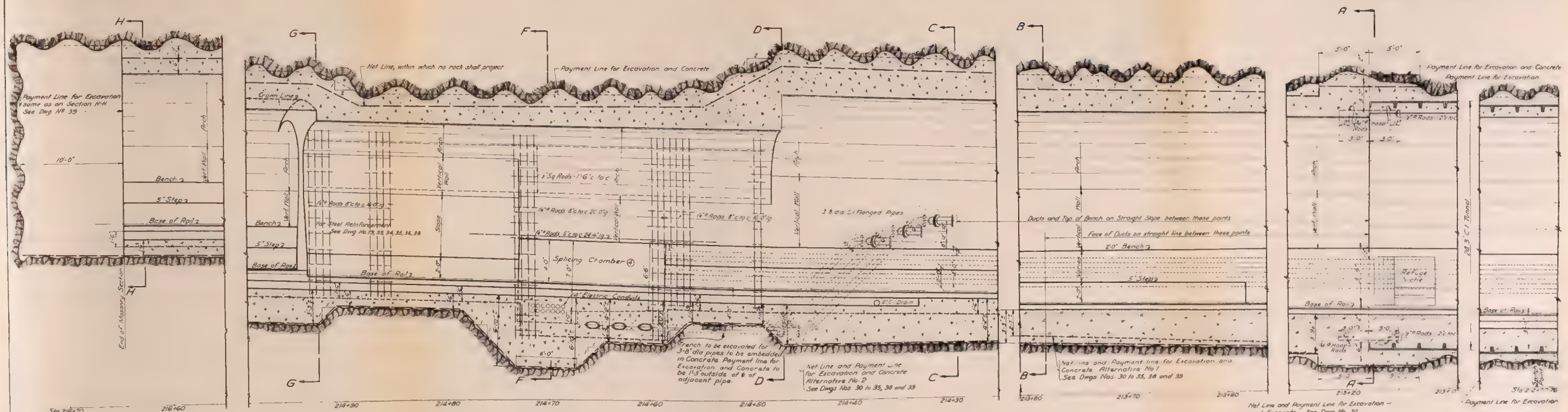
NOTES

Tunnel invert and built-up ties as located as Alternative No 1, unless otherwise shown.

The use of Tunnel Invert as shown on Alternative No 2 will require such additional or less grade, drainage, etc, and will be determined by Engineer.


Payment line for Excavation same as on Section H-H, West Bound Passenger Track. See Dwg No 39
Net line, within which no rock shall project
Payment line for Excavation and Concrete
Crown Line
Vertical Wall Arch
End of Pier
Slope
Base of Rail
2'-0" Bench
5" Step
10'-0"
2'-0" Vertical Wall Arch
14'-0" Rods - 8'-2" c to c x 20'-0" lg
14'-0" Rods - 8" c to c x 16'-0" lg
16'-0" lg
1" ø Rods - 1'-6" c to c
For Steel Reinforcement see Dwgs. Nos 29, 33, 34, 35, 38.
14'-0" Rods - 6" c to c x 24'-6" lg
Splicing Chamber (1)
Drainage Trough
Net line and Payment line for Excavation and Concrete Alternative No 2 See Dwgs. Nos 32 to 35, 38, 39.
Net line and Payment line for Excavation and Concrete Alternative No 1 See Dwgs. Nos 32 to 35, 38, 39.
5'-0" Rods - 12" c to c
3'-0"
Concrete Lining
Unlined 18'-0" dia C.I. Tube
14'-6"
Splicing Chamber (6)
Drainage Sump
4" Electric Conduits
6'-0"
4'-0"
5'-0"
Stone Packing and Grout
Concrete Bulkhead for Packing
6" x 8" Timber Spiked and Caulked
Concrete Cradle
Payment line for Excavation
2'-0" Bench
5" Step
2'-0" Vertical Wall Arch

NOTES
Tunnel Invert will be built to lines indicated as Alternative No 1 unless otherwise directed. The use of Tunnel Invert as shown on Alternative No 2 will depend upon conditions of sub-grade, drainage etc, and will be determined by Engineer


H
G
F
D
C
B
A
Payment Line for Excavation same as on Section H-H See Dwg No 39
10'-0"
Bench
5' Step
Base of Rail
End of Masonry Section
Net Line, within which no rock shall project
Payment Line for Excavation and Concrete
Crown Line
Vert Wall Rock
Vertical Rock Wall
Slope
Vertical Rock
Vertical Wall
Rock
1" Sq Rods 1'6" c to c
1¼" Rods 8' c to c 40'0" lg
For Steel Reinforcement See Dwg Nos 29, 33, 34, 35, 36, 38
1¼" Rods 8' c to c 20'0" lg
1¼" Rods 8' c to c 16'0" lg
1¼" Rods 8' c to c 24'6" lg
3 8 dia CI Flanged Pipes
Splicing Chamber ④
4" Electric Conduits
6" Drain
Trench to be excavated for 3'-8" dia pipes to be embedded in Concrete. Payment line for Excavation and Concrete to be 1'-3" outside of ℄ of adjacent pipe.
Net Line and Payment Line for Excavation and Concrete Alternative No 2 See Dwgs Nos 30 to 35, 38 and 39
Ducts and Top of Bench on Straight Slope between these points
Face of Ducts on straight line between these points
2'-0" Bench
Net Lines and Payment Line for Excavation and Concrete Alternative No 1 See Dwgs Nos 30 to 35, 38 and 39
5'-0"
Payment Line for Excavation and Concrete
Payment Line for Excavation
¾" Rods 2'0" c to c
¾" Hook Rods
3'0"
Heritage Niche
¾" Rods 2'6" c to c
28'3" C I Tunnel
Base of Rail
Sta 216+70
216+60
214+90
214+80
214+70
214+60
214+50
214+40
214+30
213+80
213+70
213+60
213+20
213+00
212+76

REFERENCES:
For Index of Contract Plans, see Contract Drawing No 1
Section "A-A" see Contract Drawing No 30.
" " "B-B" " " " " 31
" " "C-C" " " " " 32
" " "D-D" " " " " 33
" " "E-E" " " " " 35
" " "F-F" " " " " 36
" " "G-G" " " " " 38
" " "H-H" " " " " 39

SPECIAL CONSTRUCTION LONGITUDINAL SECTION N-N

Approved
Consultants

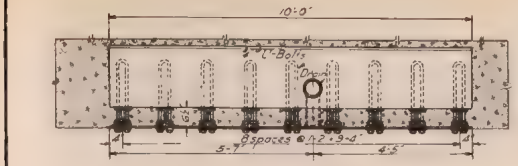
STATE OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 41

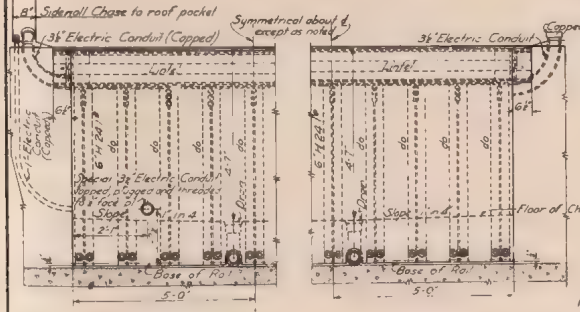
SCALE 1" = 5'-0" FEET DATE JAN 15 1929

FILE No C 4A

Drawn F.K.V.
Traced by A.B.
Checked J.H.C.B. WHEC

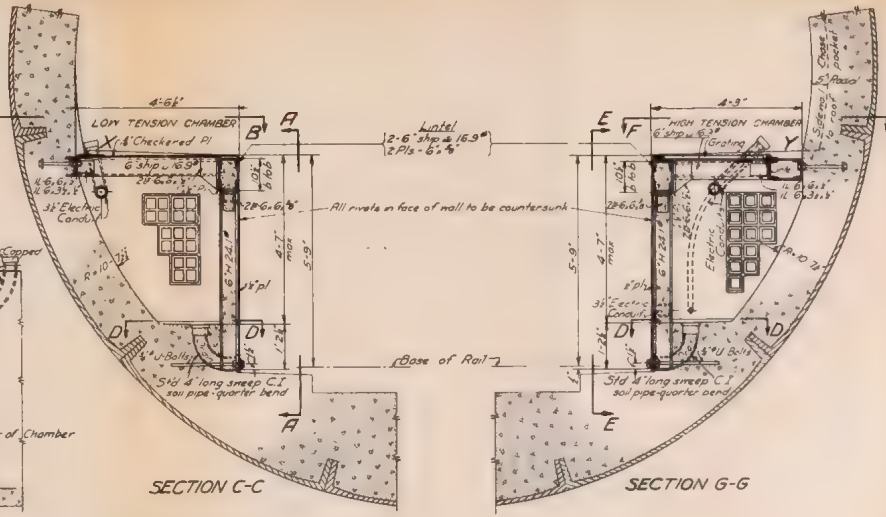


SECTION D-D



SECTION E-E
H.T. CHAMBER

SECTION A-A
L.T. CHAMBER

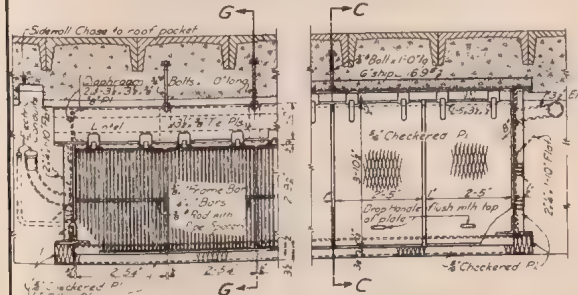


SECTION C-C

SECTION G-G

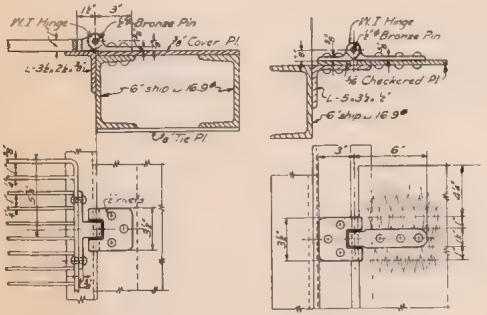
REFERENCE.
For Index of Contract Plans
see Contract Drawing No.1

NOTES - 1" Electric Conduit and Sidenoll Chase shall be provided at every third H.T. Chamber, and at one end of chamber only.
One Drain per chamber located off centre as shown.
High Tension Chambers shall be spaced 350 ft c to c
Low Tension Chambers shall be spaced 570 ft c to c



SECTION F-F
H.T. CHAMBER

SECTION B-B
L.T. CHAMBER



DETAIL AT Y

DETAIL AT X

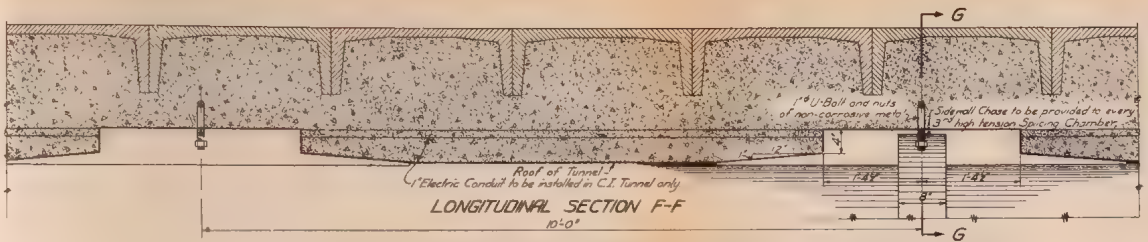
STANDARD SPLICING CHAMBERS
(CAST IRON TUNNEL)

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

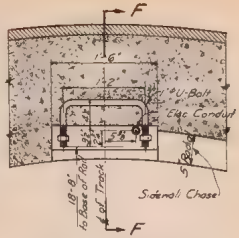
THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 42

FILE Nº C 4A



LONGITUDINAL SECTION F-F

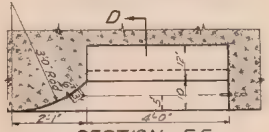


CROSS SECTION G-G

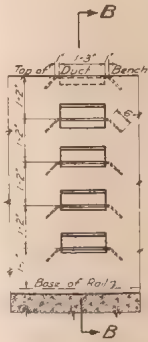
ROOF POCKET FOR OVERHEAD CONDUCTOR - IN EARTH TUNNEL

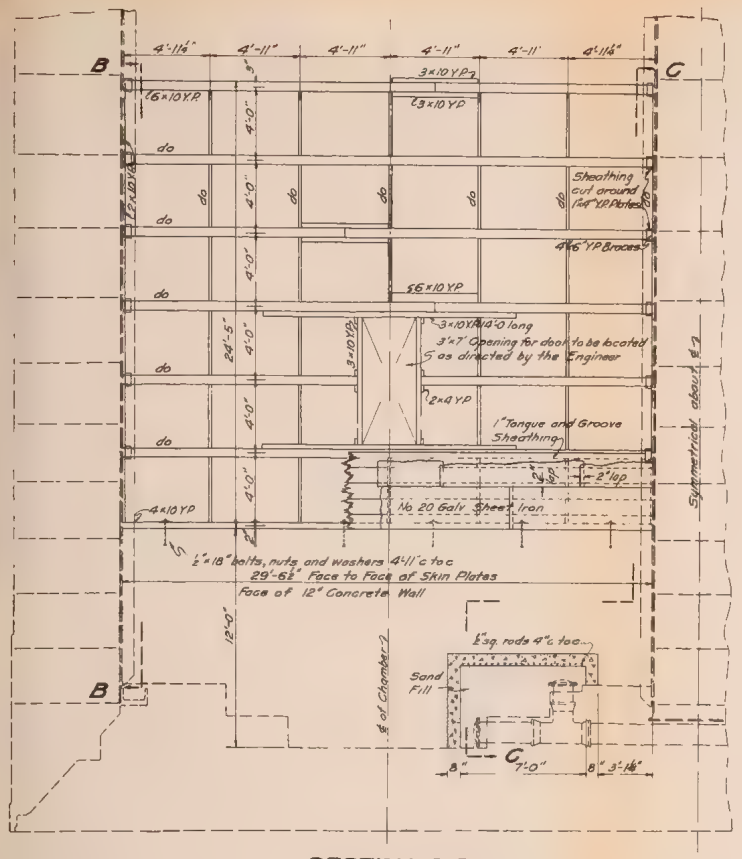
SCALE 1 0 1 2 3 4 5 6 INCHES

In Rock Tunnel, Roof Pockets and Electric Conduit may be omitted and U-Bolts made longer.

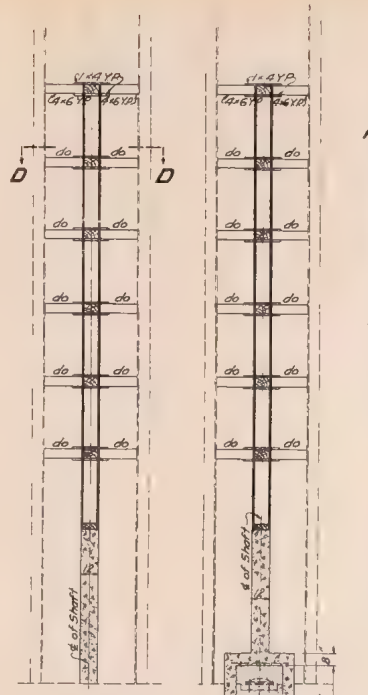


SECTION E-E


B
1'-3"
Top of Duct Bench
1'-2"
1'-2"
1'-2"



SECTION A-A

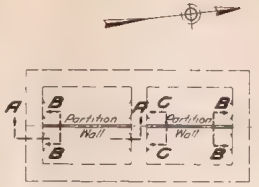


SECTION B-B

North and South Walls

SECTION C-C

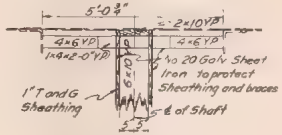
Middle Wall



PLAN OF SHAFT

Showing location of Partition Wall

Scale ——— Feet



SECTION D-D

Scale ——— Feet

Shaft construction indicated thus – — not included in this contract

REFERENCE:
For Index of Contract Plans see Contract Drawing No. 1.

TEMPORARY PARTITION WALL IN SHORE ROAD SHAFT, BROOKLYN

Drawn ACS
Traced [illegible]
Checked [illegible]

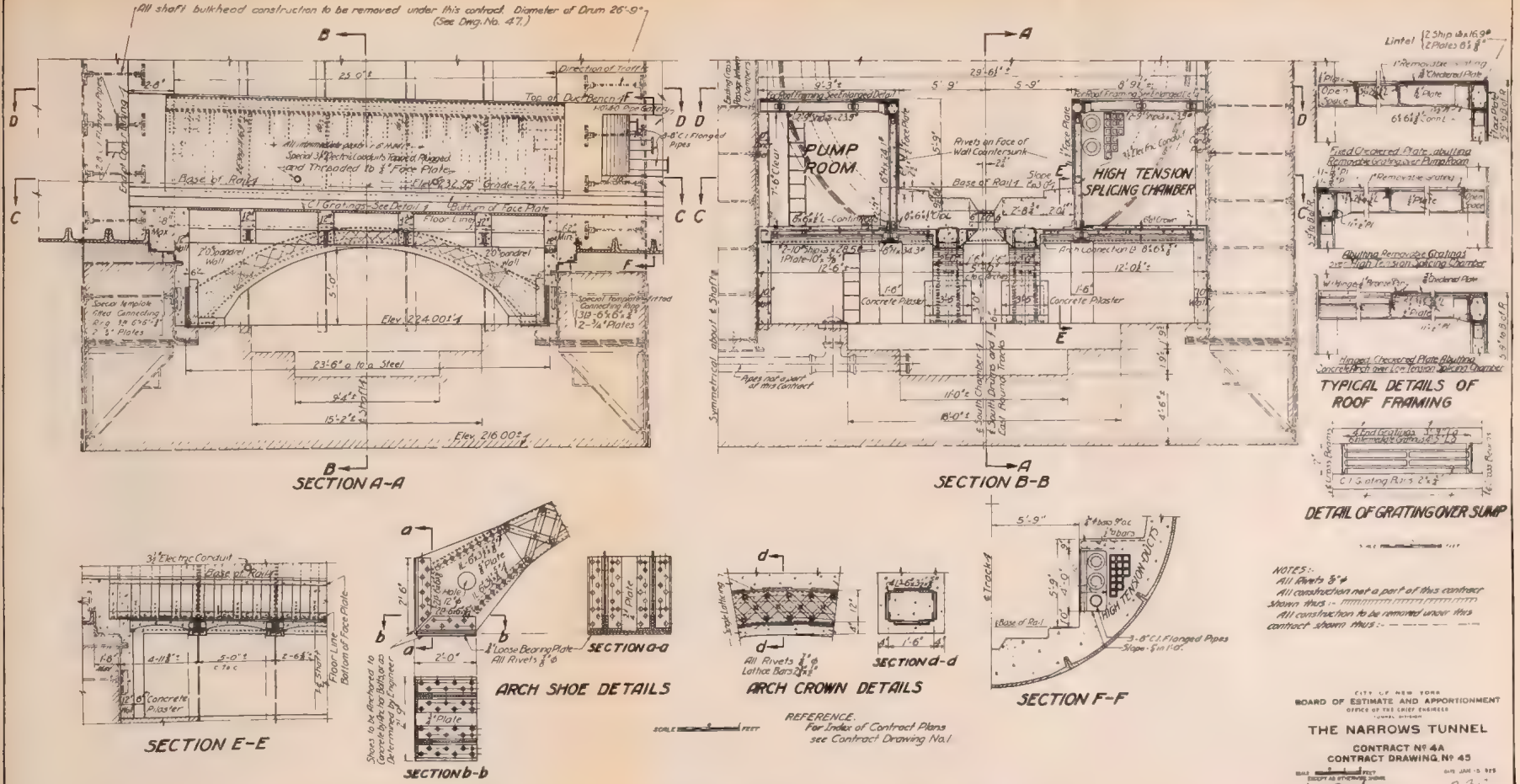
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 44

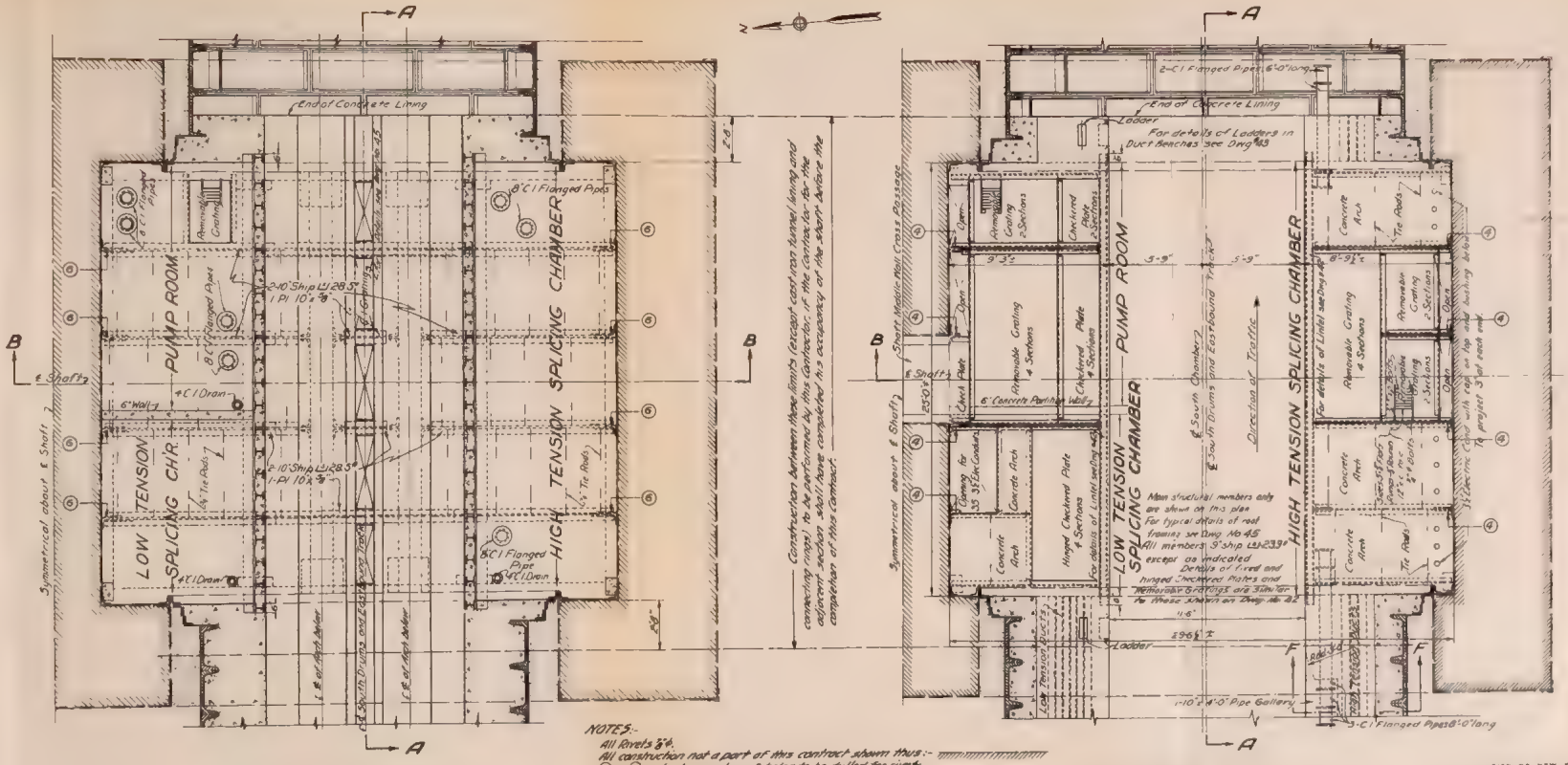
SCALE 1 INCH = 4 FEET
DATE JAN. 15, 1923

FILE Nº C 4A


All shaft bulkhead construction to be removed under this contract. Diameter of Drum 26'-9"
(See Dwg. No. 47.)
SECTION A-A
SECTION B-B
PUMP ROOM
HIGH TENSION SPLICING CHAMBER
TYPICAL DETAILS OF ROOF FRAMING
DETAIL OF GRATING OVER SUMP
SECTION E-E
ARCH SHOE DETAILS
SECTION a-a
SECTION b-b
ARCH CROWN DETAILS
SECTION d-d
SECTION F-F
NOTES:-
All Rivets 5/8"ø
All construction not a part of this contract shown thus :-
All construction to be removed under this contract shown thus :-
REFERENCE.
For Index of Contract Plans see Contract Drawing No.1
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION
THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 45
FILE Nº C4A

Drawn S.F.H.
Traced J.T.
Checked M.B.P.

INTERIOR CONSTRUCTION AT SHORE ROAD SHAFT. BROOKLYN.


A
B
End of Concrete Lining
LOW TENSION SPLICING CHR.
PUMP ROOM
HIGH TENSION SPLICING CHAMBER
Symmetrical about ℄ Shaft 2
℄ Shaft 2
6'C.I Flanged Pipes
2-10" Ship L.J. 28.5#
1-Pl 10"x⅜"
6" Wall
4" C.I Drain
Armour Grating
Tie Rods
Construction between these limits (except cast iron tunnel lining and connecting rings) to be performed by this contractor; if the contractor for the adjacent section shall have completed his occupancy of the shaft before the completion of this contract.
2-C.I Flanged Pipes 6'-0" long
Ladder
For details of Ladders in Duct Benches see Dwg No 43
Open
Armour Grating 2 Sections
Checkered Plate 2 Sections
Symmetrical about ℄ Shaft 2
Steel Mesh Wire Cable Passage
Removable Grating 4 Sections
Checkered Plate 4 Sections
6" Concrete Partition Wall
℄ Shaft 2
Direction of Traffic
℄ South Chamber 2
℄ 36" I in Drums and Eastbound Tracks
Removable Grating 2 Sections
Concrete Arch
Tie Rods
Grating for 35" I Beam Girders
Hinged Checkered Plate 4 Sections
For details of Lintel see Dwg No 42
Removable Grating 4 Sections
Hinged Checkered Plates 4 Sections
Removable Grating 2 Sections
Hinged Checkered Plate 2 Sections
Door
Concrete Arch
Tie Rods
Ladder
1-10"x4'-0" Pipe Gallery
3-C.I Flanged Pipes 8'-0" long
Main structural members only are shown on this plan
For typical details of roof framing see Dwg No 45
All members 9" Ship L.J. 23.9# except as indicated
Details of fixed and hinged Checkered Plates and Removable Gratings are similar to those shown on Dwg No 42
Concrete Arch with roof on top and bushing below to project 3" at each end
Electric Conduits

SECTIONAL PLAN C-C

SECTIONAL PLAN D-D

NOTES:-
All Rivets ⅞".
All construction not a part of this contract shown thus:-
④ or ② indicates number of holes to be drilled for rivets in outstanding legs of existing vertical angles.

REFERENCE
For Index of Contract Plans see Contract Drawing No. 1.

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 46

SCALE 1" = 1 FOOT
DATE JAN 15 1925

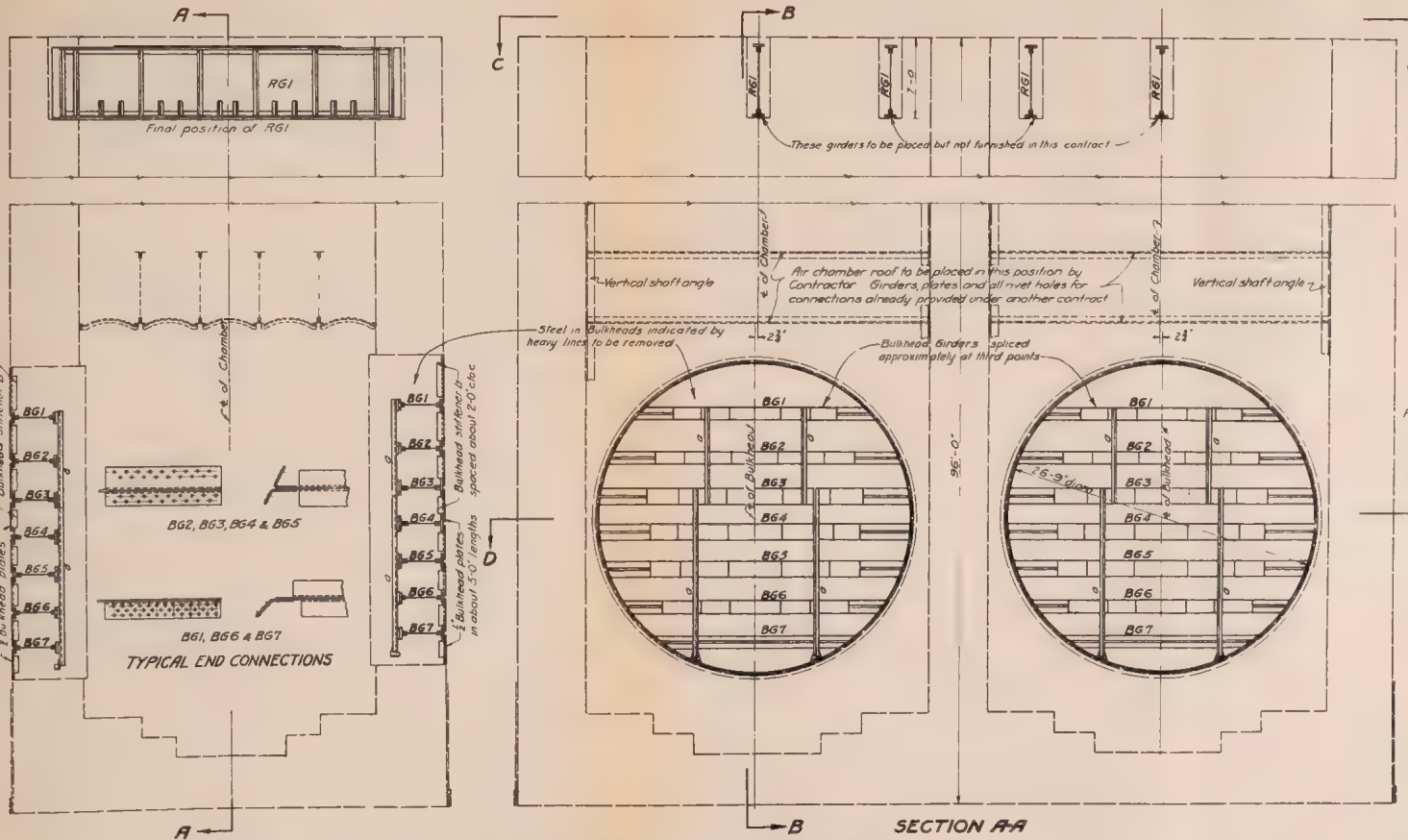
Chief Engineer
Tunnel Engineer

FILE Nº C4A

Drawn E.H.M.
Traced C.C.
Checked M.J.K.

INTERIOR CONSTRUCTION AT SHORE ROAD SHAFT. BROOKLYN.

H.B.&B. JOB PRINTING & BIND. CO. N.Y.



GIRDER SCHEDULE				
MARK	LENGTH	DEPTH	FLANGE WIDTH	APPROX WT TONS
BG1	19'-9 3/4"	3'-10 1/4"	13"	2.3
BG2	24'-7 3/8"	3'-10 1/4"	13"	3.7
BG3	26'-6"	3'-10 3/8"	17"	4.9
BG4	26'-8 3/4"	3'-10 1/4"	17"	4.3
BG5	25'-3 3/4"	3'-10 3/8"	17"	4.3
BG6	22'-1 3/4"	3'-10 3/8"	13"	3.0
BG7	16'-3 3/4"	3'-10"	13"	1.9
RG1	29'-5 1/2"	6'-2 1/4"	13"	7.0

REFERENCE
For Index of Contract Plans see Contract Drawing No. 1

Shaft construction shown thus - - - - not included in this contract

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 47

Scale 1 inch = 10 feet
Except as noted
Date JAN 19 1923

Chief Engineer

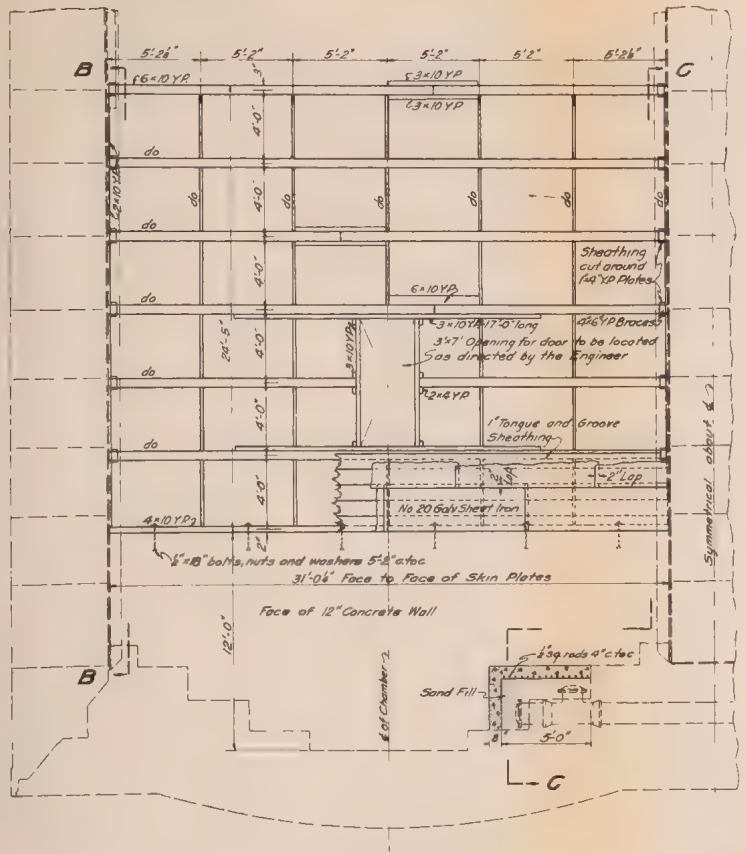
Borough President

FILE Nº C 4A

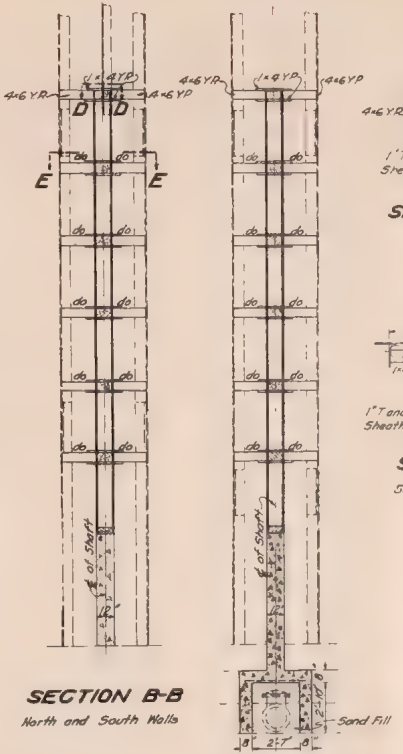
Drawn EE
Traced EE
Checked WS

Assistant Engineer

SHORE ROAD SHAFT, BROOKLYN.

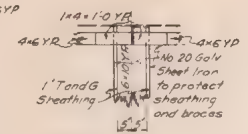


SECTION A-A

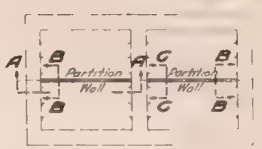


SECTION B-B
North and South Walls

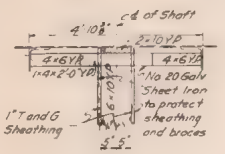
SECTION C-C
Middle Wall



SECTION D-D



PLAN OF SHAFT
Showing location of Partition Wall
Scale Feet



SECTION E-E
Scale Feet

Shaft construction indicated thus ——— not included in this contract

REFERENCE
For Index of Contract Plans see Contract Drawing No. 1

TEMPORARY PARTITION WALL IN SOUTH ST. SHAFT, RICHMOND

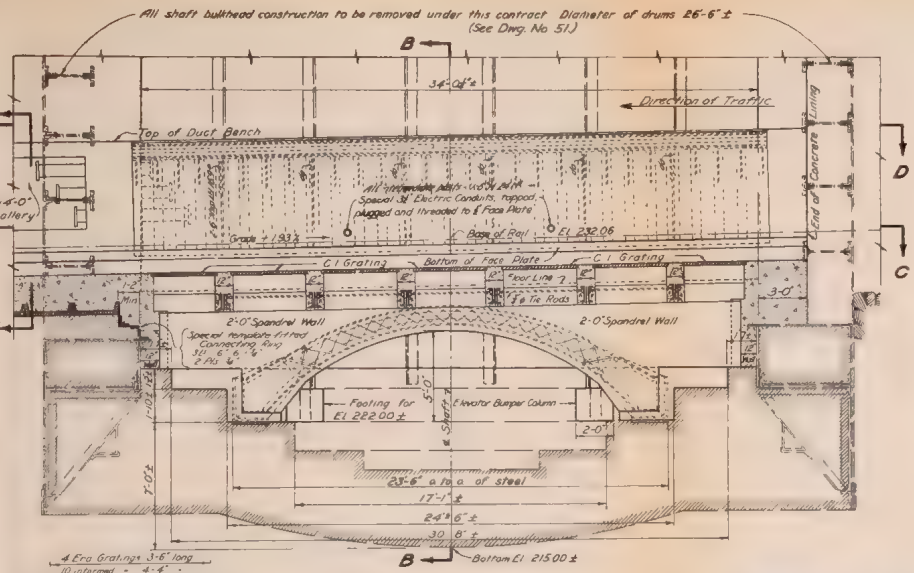
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL
CONTRACT No 4A
CONTRACT DRAWING No 4B

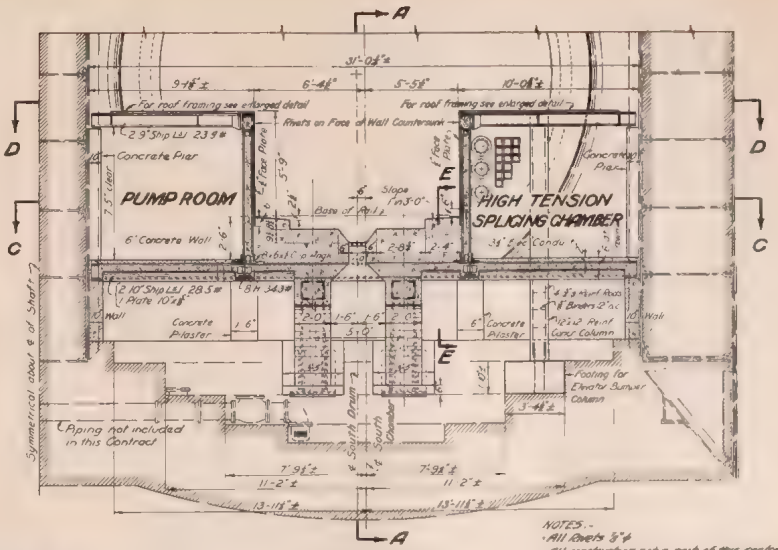
Scale Feet

FILE No C 4A

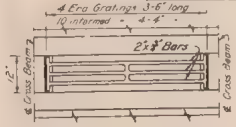
Drawn ACS
Traced JWH
Checked ACS


All shaft bulkhead construction to be removed under this contract Diameter of drums 26'-6" ±
(See Dwg. No. 51.)
Direction of Traffic
Top of Duct Bench
1'-10"x4'-0" Pipe Gallery
Grade +193'
Base of Rail El 232.06
C.I. Grating
Bottom of Face Plate
Floor Line
2'-0" Spandrel Wall
Special template fitted Connecting Ring
Footing for El 222.00 ±
Elevator Bumper Column
23'-6" c to c of steel
17'-1" ±
24'-6" ±
30'-6" ±
Bottom El 215.00 ±

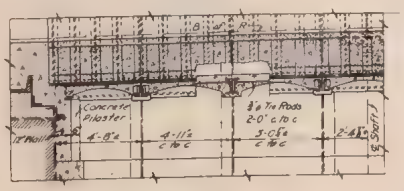
SECTION A-A



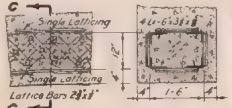
SECTION B-B



DETAILS OF C.I. GRATING OVER SUMP

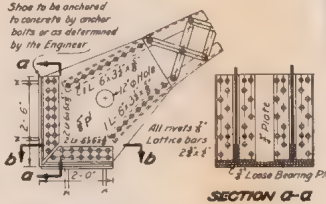


SECTION E-E

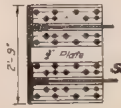


SECTION C-C

ARCH CROWN DETAIL

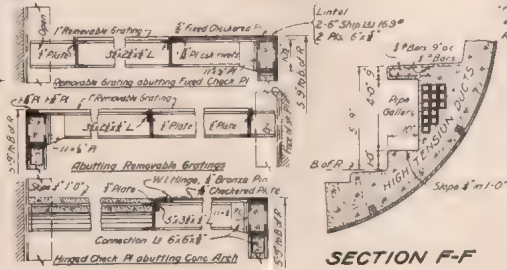

Shoe to be anchored to concrete by anchor bolts or as determined by the Engineer
2 L 6"x6"x⅞"
All rivets ⅞" Lattice bars 2½"ϕ
1" Plate
¾"ϕ Loose Bearing Plate

SECTION a-a



SECTION b-b

ARCH SHOE DETAILS



TYPICAL DETAILS OF ROOF FRAMING

SECTION F-F

NOTES:-
- All Rivets ⅞"ϕ
- All construction not a part of this contract shown thus :-
- All construction to be removed under this contract shown thus :-

REFERENCE
For Index of Contract Plans see Contract Drawing No. 1.

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

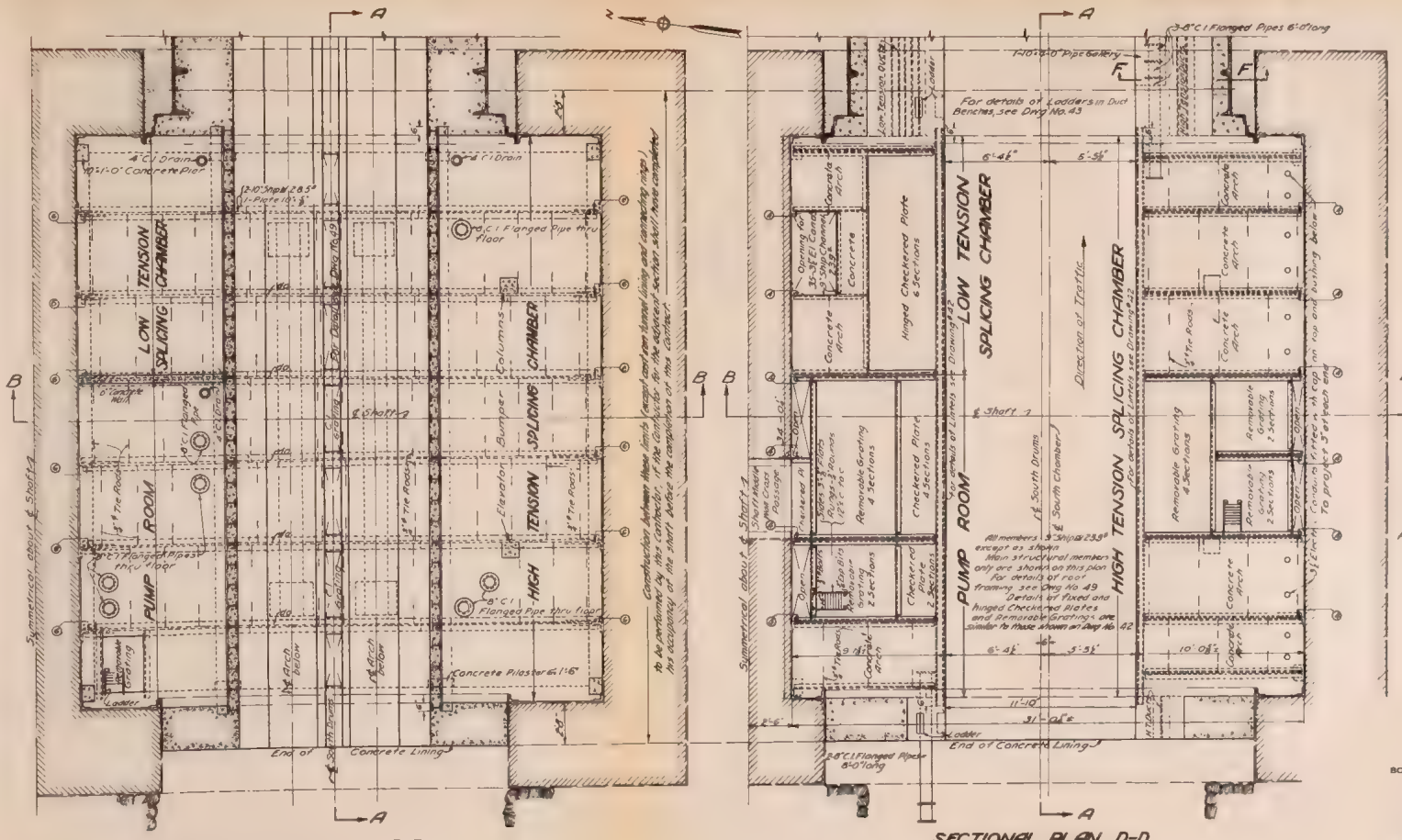
CONTRACT Nº 4A
CONTRACT DRAWING Nº 49

SCALE ... FEET
DATE JAN 15 1909
APPROVED
CHIEF ENGINEER
TUNNEL ENGINEER

FILE Nº C4A

Drawn [illegible]
Traced [illegible]
Checked [illegible]

INTERIOR CONSTRUCTION AT SOUTH ST. SHAFT, RICHMOND.


LOW TENSION SPLICING CHAMBER
PUMP ROOM
HIGH TENSION SPLICING CHAMBER
Symmetrical about ℄ Shaft A
Concrete Pilaster
End of Concrete Lining
Ladder
Hinged Checkered Plate 6 Sections
Checkered Plate 4 Sections
Removable Grating 4 Sections
Direction of Traffic
For details of Ladders in Duct Benches, see Dwg No. 43
All members 9"Ship@ 23.9" except as shown
Main structural members only are shown on this plan
For details of roof framing, see Dwg No. 49
Details of fixed and hinged Checkered Plates and Removable Gratings are similar to those shown on Dwg No. 42
NOTES:-
All Rivets ⅞"ϕ
All Construction not a part of this contract shown thus:-
ⓐ or ⓑ indicates number of holes to be drilled for rivets in outstanding legs of existing vertical angles
REFERENCE
For Index of Contract Plans see Contract Drawing No.1

SECTIONAL PLAN C-C

SECTIONAL PLAN D-D

INTERIOR CONSTRUCTION AT SOUTH ST. SHAFT, RICHMOND.

Drawn [illegible]
Traced by
Checked M.D.R. WHEN. RES

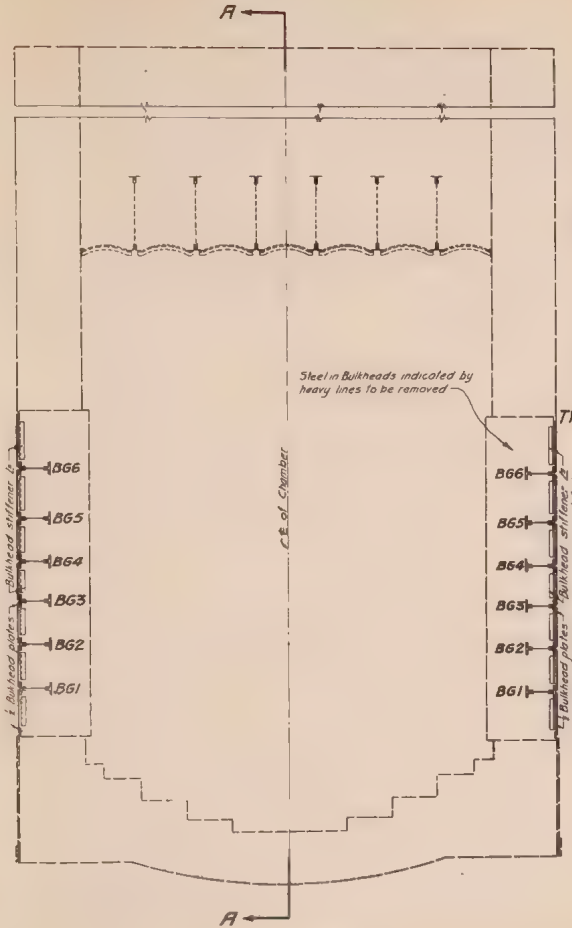
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
BUREAU OF DESIGN

THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 50

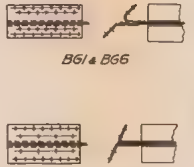
SCALE 1/4" = 1 FOOT DATE JAN 3 1928

CHIEF ENGINEER

FILE Nº C4A



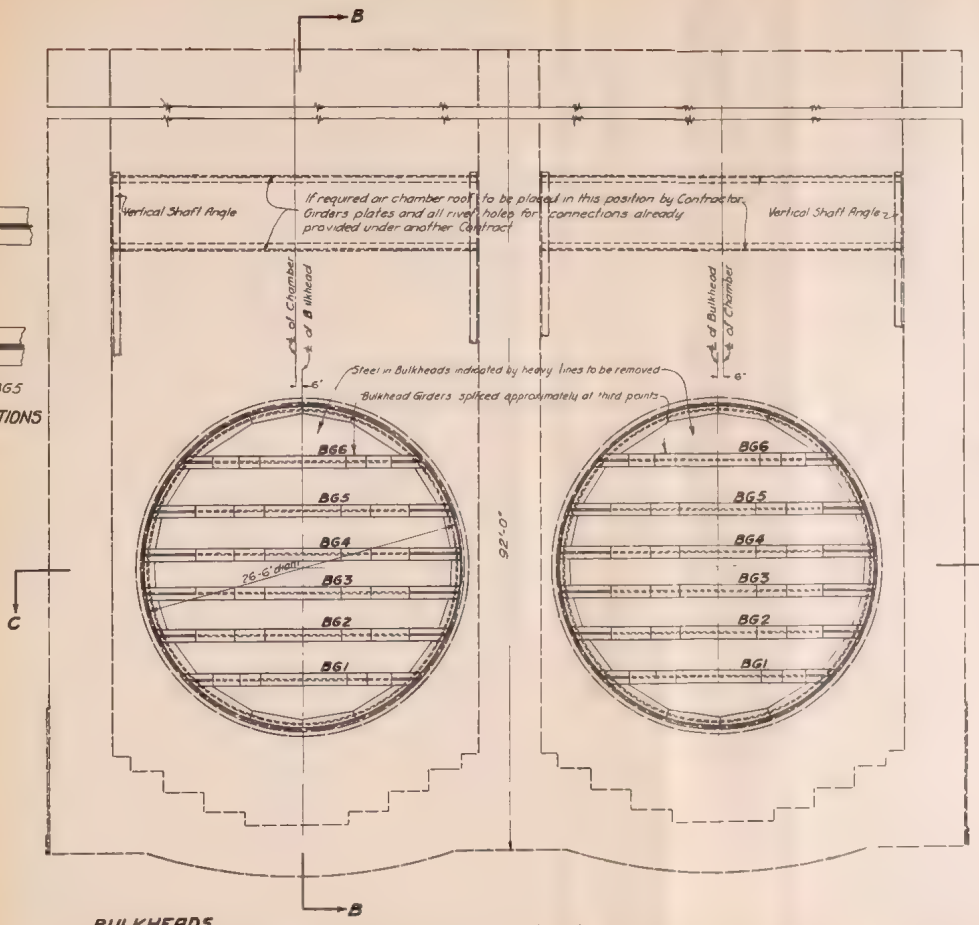
SECTION B-B



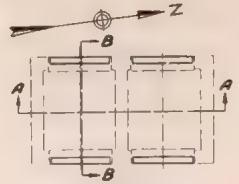
BG1 & BG6

BG2, BG3, BG4 & BG5

TYPICAL END CONNECTIONS



SECTION A-A



SECTION C-C

Scale 0 10 20 FEET

GIRDER SCHEDULE				
MARK	LENGTH	DEPTH	WIDTH OF FLANGES	APPROX WT TONS
BG6	19'-10½"	2'-7⅞"	13"	1.6
BG5	24'-9½"	2'-7⅞"	13"	2.6
BG4	26'-5"	2'-7⅞"	13"	2.9
BG3	26'-1"	2'-7⅞"	13"	2.9
BG2	23'-11⅛"	2'-7⅞"	13"	2.6
BG1	18'-11⅜"	2'-7⅞"	13"	1.6

REFERENCE
For Index of Contract Plans see Contract Drawing No 1

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT N° 4A
CONTRACT DRAWING N° 51

SCALE 1 FOOT
Except as shown

DATE JAN 18, 1926

CHIEF ENGINEER

TUNNEL ENGINEER

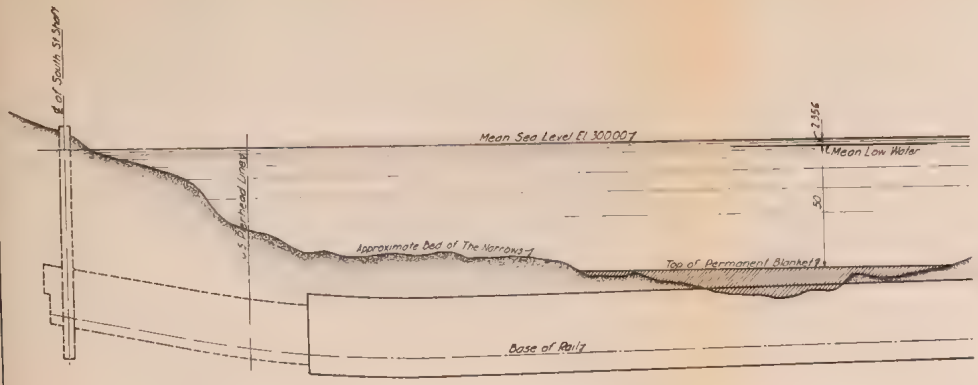
FILE N°C4A

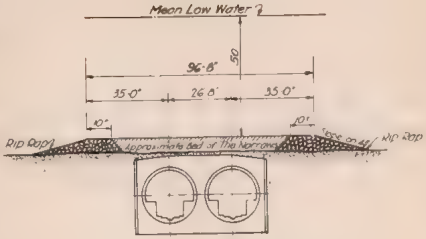
Drawn JJK
Traced LC
Checked JJR

DESIGNING ENGINEER

BULKHEADS

SOUTH ST. SHAFT, RICHMOND.



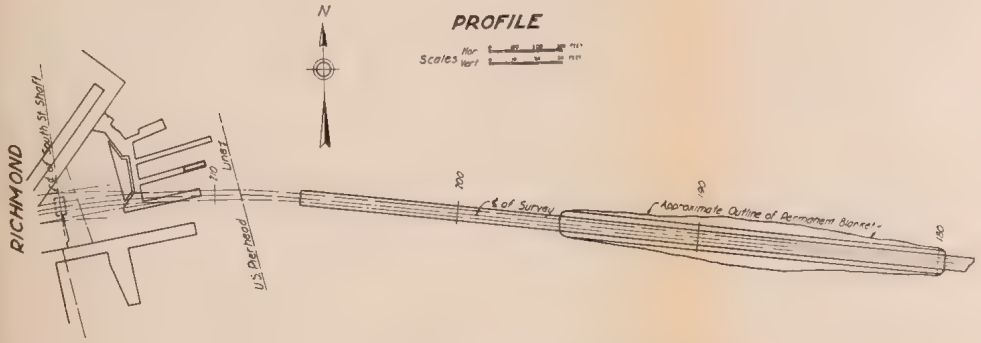


TYPICAL CROSS SECTION

Scale 0 40 80 120 FEET

PROFILE

Scales Hor 0 80 120 160 FEET
Vert 0 40 80 FEET



PLAN

Scale 0 100 200 300 FEET

NOTE:
No stone of the rip-rap shall be larger than two (2) feet in any direction

Reference
For Index of Contract Plans, see Contract Drawing No 1

Approved:
G. Kyriazi
Daniel Barnes
Ludwik C. Holle
S. A. Woodard
Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

THE NARROWS TUNNEL

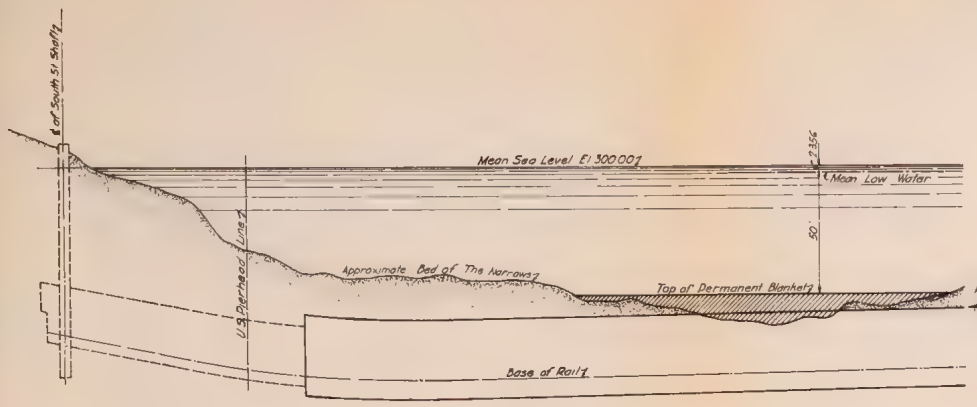
CONTRACT Nº 4 A
CONTRACT DRAWING Nº B2

PERMANENT BLANKET
ALTERNATIVE PLAN I

FILE Nº C 4 A

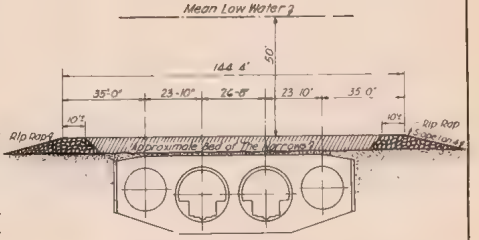
Drawn C.W.R.
Traced C.W.R.
Checked J.V.B.

H. B. BROWN PRINTING & BINDING CO., N.Y.



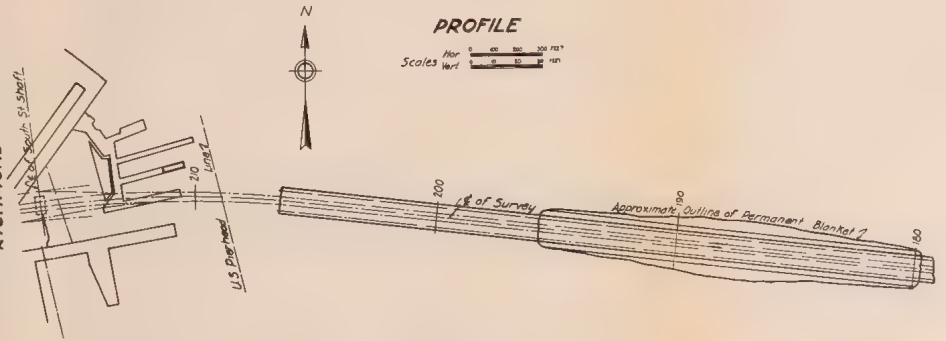
PROFILE

Scales Hor
Vert



TYPICAL CROSS SECTION

Scale



PLAN

Scale

NOTE.
No stone of the rip-rap shall be larger than two (2) feet in any direction

Reference

For Index of Contract Plans, see Contract Drawing No.1

Approved

Consultants

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

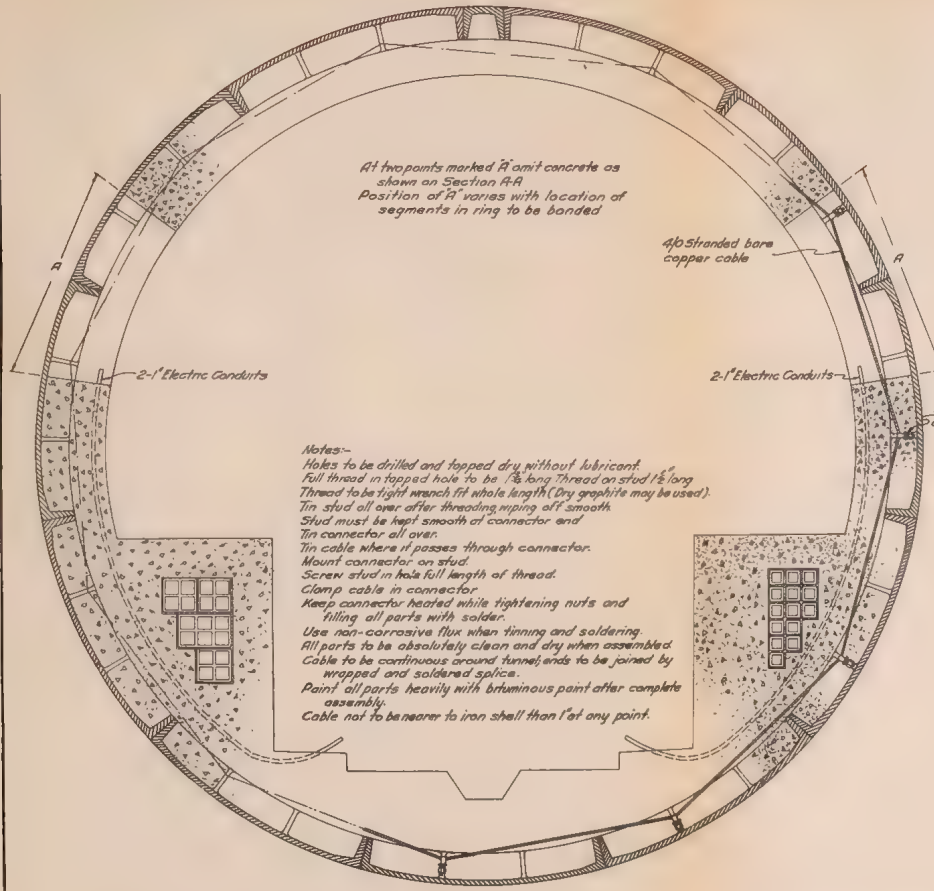
CONTRACT Nº 4 A
CONTRACT DRAWING Nº 53

SCALE AS INDICATED

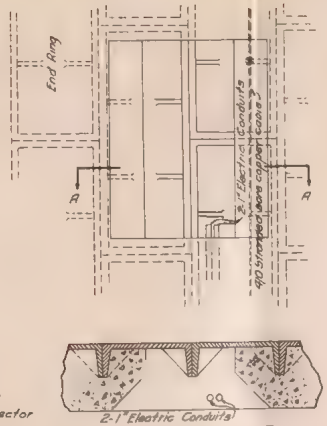
FILE Nº C 4 A

PERMANENT BLANKET
ALTERNATIVE PLAN 2

Drawn C.N.F.
Traced
Checked

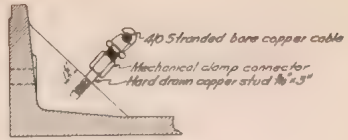

At two points marked 'A' omit concrete as shown on Section A-A
Position of 'A' varies with location of segments in ring to be bonded
4/0 Stranded bare copper cable
2-1" Electric Conduits
2-1" Electric Conduits
Mechanical clamp connector
A
A
Notes:-
Holes to be drilled and tapped dry without lubricant.
Full thread in tapped hole to be 7/8" long Thread on stud 1 1/8" long
Thread to be tight wrench fit whole length (Dry graphite may be used).
Tin stud all over after threading wiping off smooth.
Stud must be kept smooth at connector end
Tin connector all over.
Tin cable where it passes through connector.
Mount connector on stud.
Screw stud in hole full length of thread.
Clamp cable in connector.
Keep connector heated while tightening nuts and filling all parts with solder.
Use non-corrosive flux when tinning and soldering.
All parts to be absolutely clean and dry when assembled.
Cable to be continuous around tunnel; ends to be joined by wrapped and soldered splice.
Paint all parts heavily with bituminous paint after complete assembly.
Cable not to be nearer to iron shell than 1" at any point.

TYPICAL BOND



SECTION A-A

Type "A" to be used where Cast Iron Tunnel construction is interrupted



DETAIL OF BOND

Scale Inches

Reference
For Index of Contract Plans, see Contract Drawing No 1

ELECTROLYSIS BOND

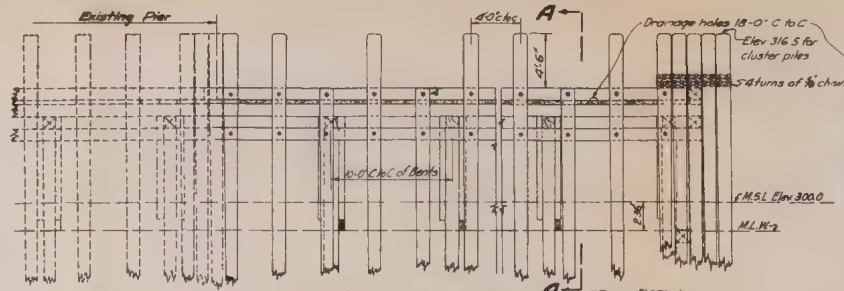
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

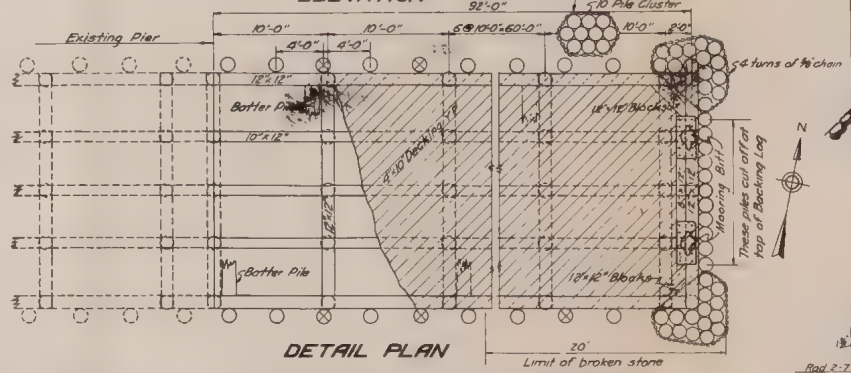
THE NARROWS TUNNEL

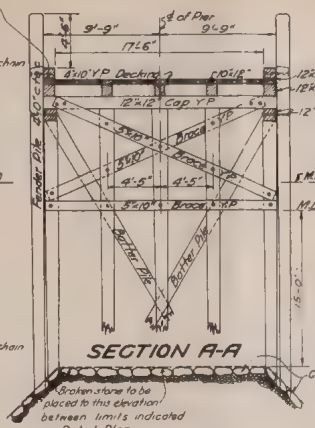
CONTRACT No 4 A
CONTRACT DRAWING No 54

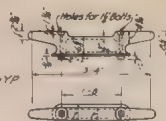
FILE No C 4A

Drawn JMM.
Traced JMM.
Checked JHS
DRAWING ENGINEER





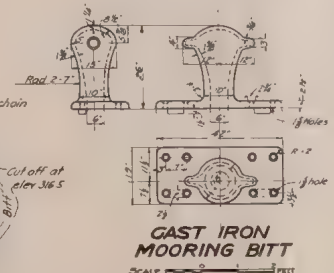


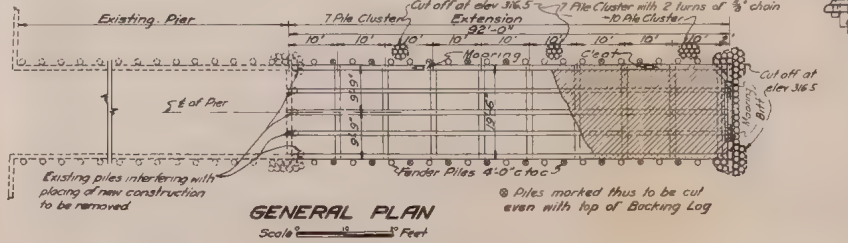


Bolts 1" dia with nuts and 2 washers
All chain wrappings to be fastened to every second pile by 1-½" x 4" galv. staple in each wrap

Covering of one man stone

REFERENCES
For Location see Dwg Nº 5.
For Index of Contract Plans, see Contract Dwg. Nº 1.





⊗ Piles marked thus to be cut even with top of Backing Log

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER

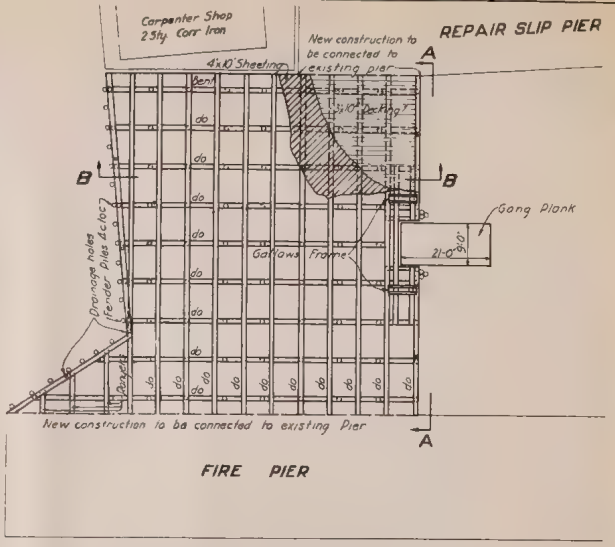
THE NARROWS TUNNEL

CONTRACT Nº 4 A
CONTRACT DRAWING Nº 55

FILE Nº C4 A

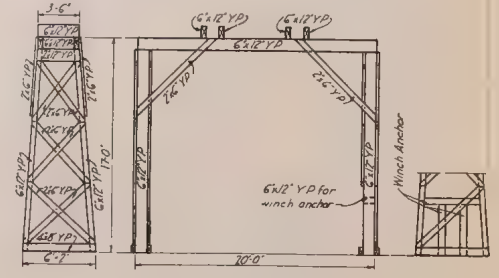
Drawn & Tr.
Traced & Tr.
Checked

REPAIR SLIP PIER EXTENSION

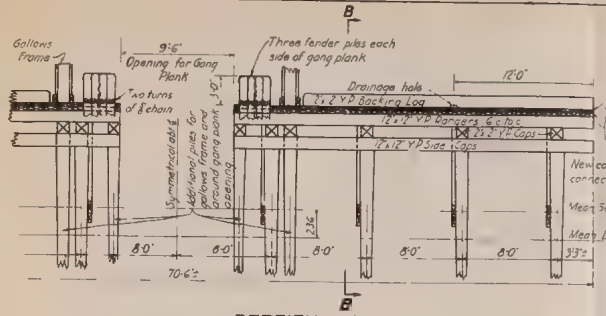


GENERAL PLAN

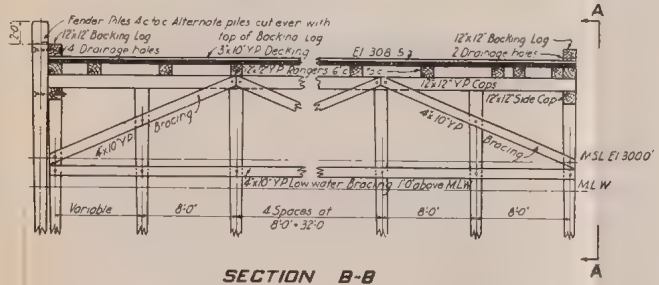
WHARF RECONSTRUCTION



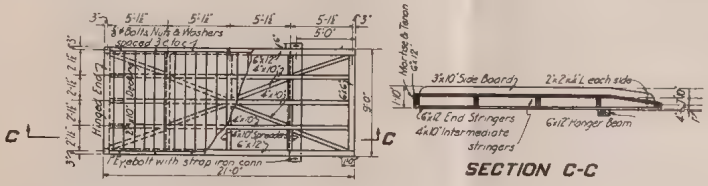
GALLOWS FRAME



SECTION A-A



SECTION B-B

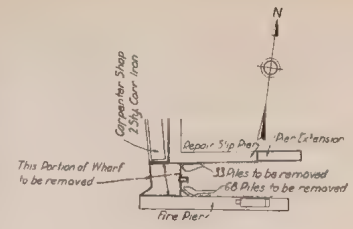


PLAN

SECTION C-C

GANG PLANK

Y.P. Timber Stringers one piece



STRUCTURES TO BE REMOVED

NOTES:-

For additional details of materials and workmanship see Contract Specifications. Gallows Frame and Gang Plank bolts ⅞" dia sq heads with nuts and two washers. Elsewhere, bolts 1"dia sq. heads with nuts and two washers.

REFERENCES.

For Location see Dwg No 5.

" Index of Contract Plans, see Contract Dwg. No 1

WHARF CHANGES

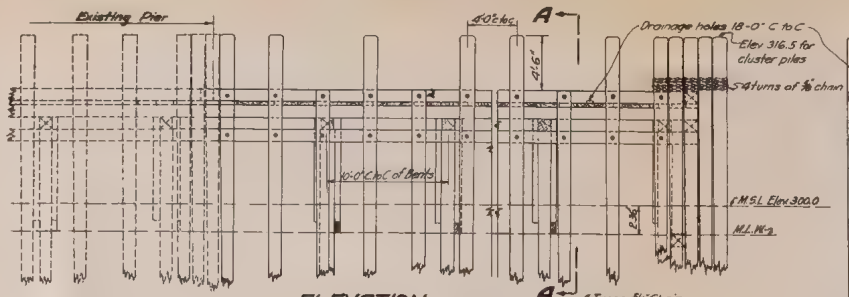
(Contractor's Area A-A, Richmond)

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

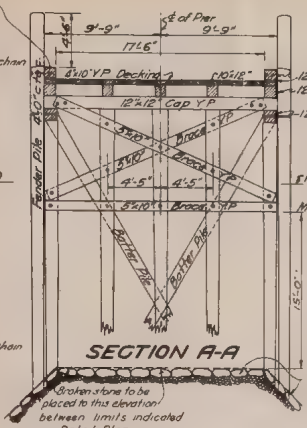
THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 56

FILE Nº C4A



ELEVATION

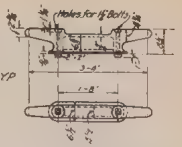


SECTION A-A

Bolts 1" dia with nuts and 2 washers
All chain wrappings to be fastened to every second pile by 1-5/8"x4" galv. staple in each wrap

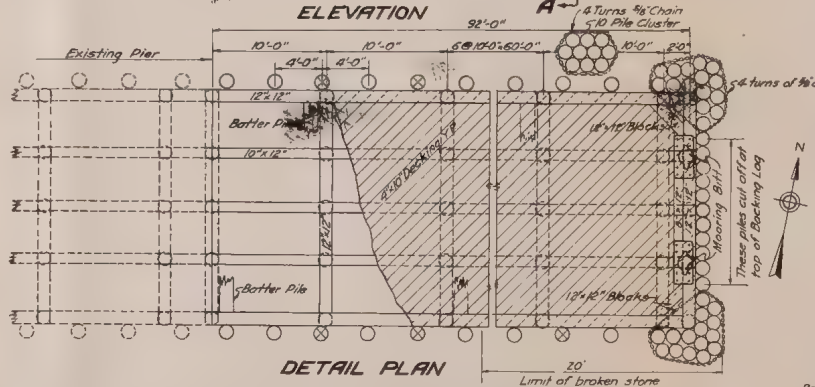
Broken stone to be placed to this elevation between limits indicated on Detail Plan

Covering of one man stone



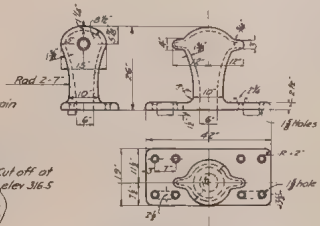
CAST IRON MOORING CLEAT

Scale 3 FEET



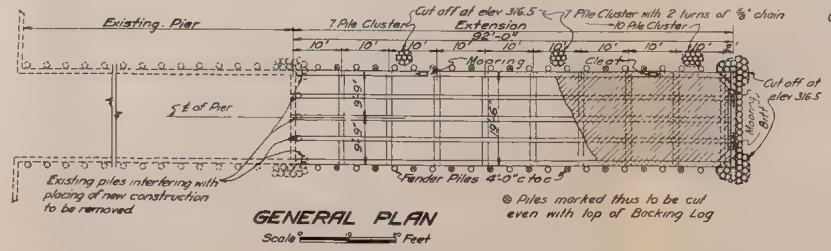
DETAIL PLAN

REFERENCES:
For Location see Dwg Nº 5.
Index of Contract Plans, see Contract Dwg. Nº 1.



CAST IRON MOORING BITT

Scale 3 FEET


Existing Pier
7 Pile Cluster
Cut off at elev 316.5
Extension
92'-0"
7 Pile Cluster with 2 turns of 5/8" chain
10 Pile Cluster
5 Mooring Cleat
℄ of Pier
Cut off at elev 316.5
Mooring Bitt
Fender Piles 4'-0" c to c
Existing piles interfering with placing of new construction to be removed

GENERAL PLAN

Scale 0 5' Feet

⊗ Piles marked thus to be cut even with top of Backing Log

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

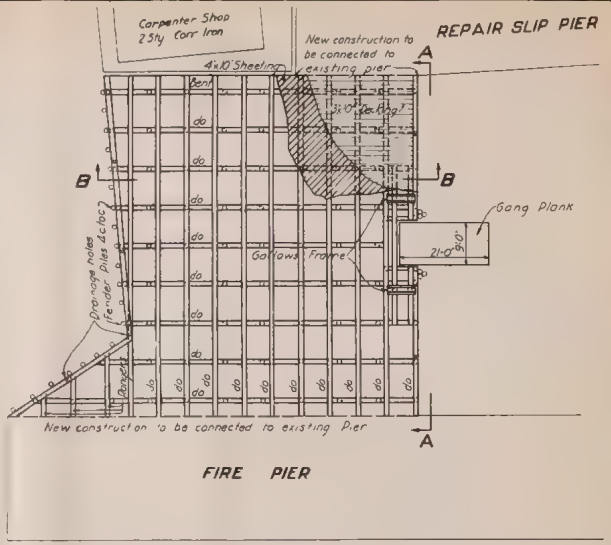
THE NARROWS TUNNEL

CONTRACT Nº 4 A
CONTRACT DRAWING Nº 35

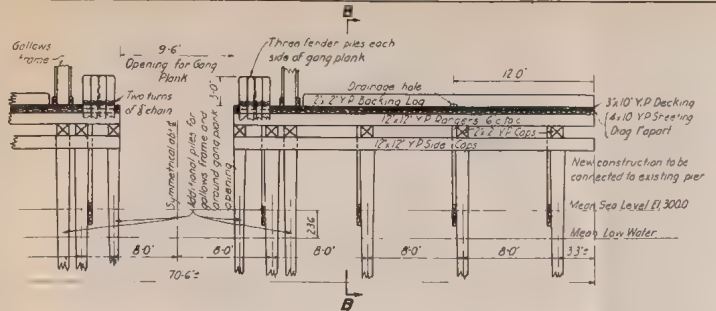
Drawn A. M.
Traced A. M.
Checked J. H. S.

REPAIR SLIP PIER EXTENSION

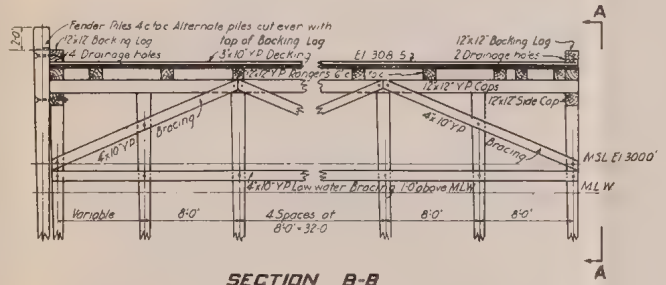
FILE Nº C 4 A



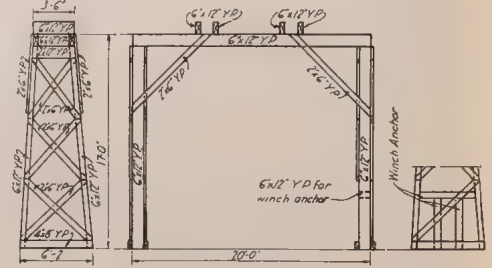
GENERAL PLAN
WHARF RECONSTRUCTION



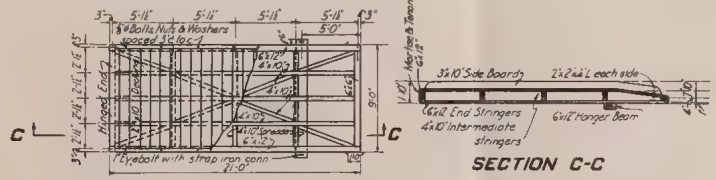
SECTION A-A


Fender Piles 4 c to c Alternate piles cut even with top of Backing Log
12"x12" Backing Log
Drainage holes
3"x10" Y.P. Decking
El 30.8 S.T.
12"x12" Backing Log
2 Drainage holes
12"x12" Y.P. Rangers 6 c to c
12"x12" Y.P. Caps
12"x12" Side Cap
4"x10" Y.P. Bracing
MSL El 30.00'
M.L.W.
4"x10" Y.P. Low water Bracing 1'0 above M.L.W.
Variable
8'-0"
4 Spaces at 8'-0" = 32'-0"

SECTION B-B



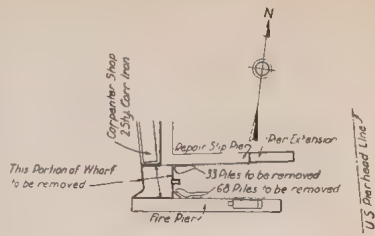
GALLOWS FRAME



PLAN

SECTION C-C

GANG PLANK
Y.P. Timber Stringers one piece



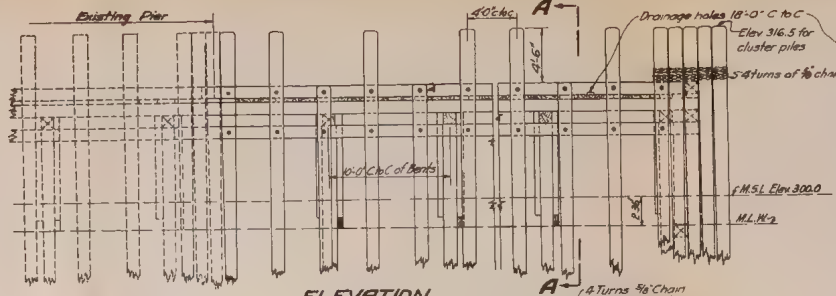
STRUCTURES TO BE REMOVED

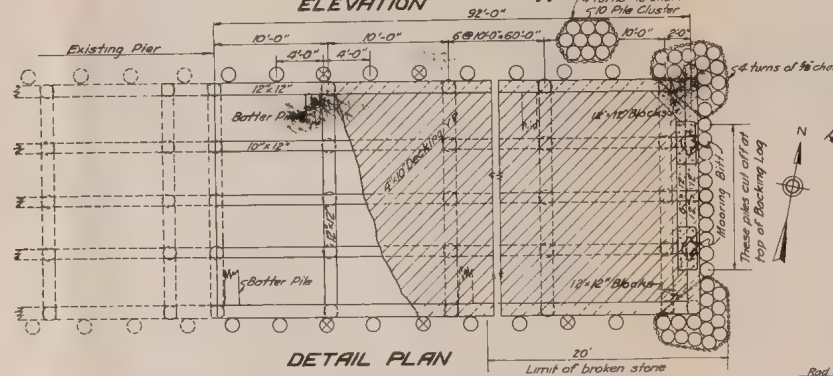
NOTES:-
For additional details of materials and workmanship see Contract Specifications. Gallows Frame and Gang Plank bolts 8" dia sq heads with nuts and two washers. Elsewhere, bolts 1"dia sq. heads with nuts and two washers.

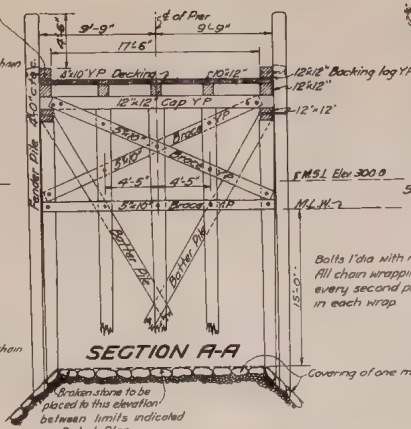
REFERENCES.
For Location see Dwg No. 5.
" Index of Contract Plans, see Contract Dwg. No. 1

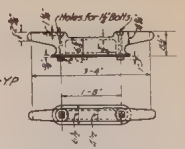
WHARF CHANGES
(Contractor's Area A A, Richmond)

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION
THE NARROWS TUNNEL
CONTRACT Nº 4 A
CONTRACT DRAWING Nº 56
FILE Nº C-4 A



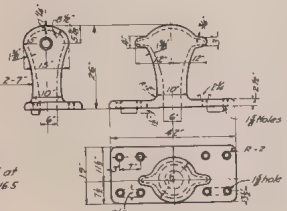


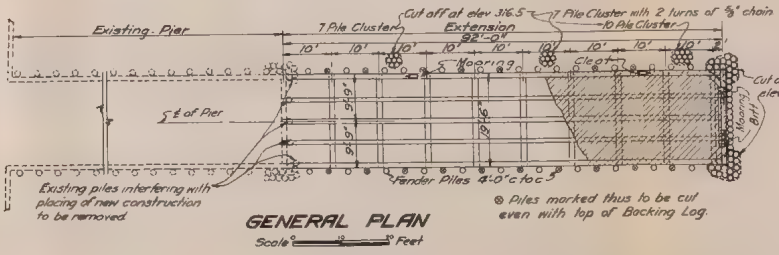




Bolts 1"dia with nuts and 2 washers. All chain wrappings to be fastened to every second pile by 1-½"w 4" galv. staple in each wrap

REFERENCES:
For Location see Dwg Nº 5.
Index of Contract Plans, see Contract Dwg Nº 1.





⊗ Piles marked thus to be cut even with top of Backing Log.

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT Nº 4 A
CONTRACT DRAWING Nº 35

SCALE AS SHOWN EXCEPT AS SHOWN
CHIEF ENGINEER

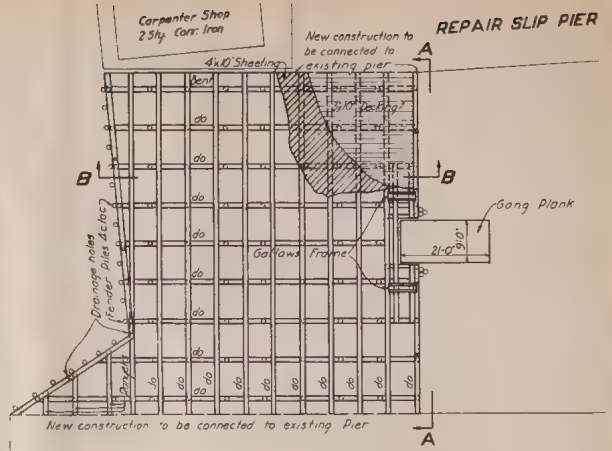
DATE JANUARY 15, 1923
TUNNEL ENGINEER

FILE Nº C 4 A

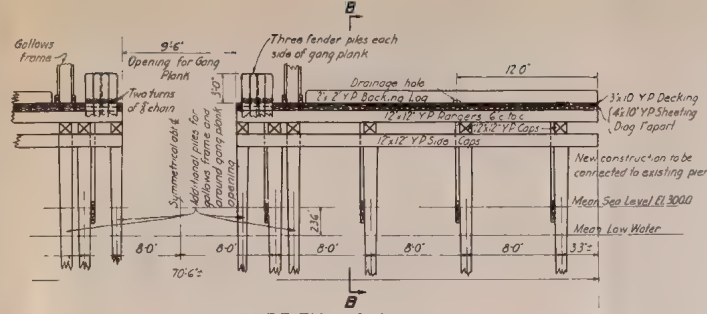
Drawn & Tr.
Traced & Tr.
Checked J. 1923

Assistant Engineer

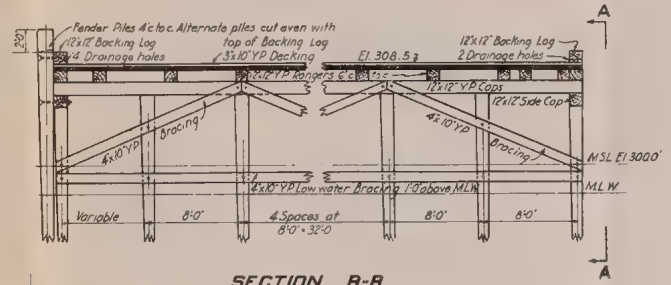
REPAIR SLIP PIER EXTENSION



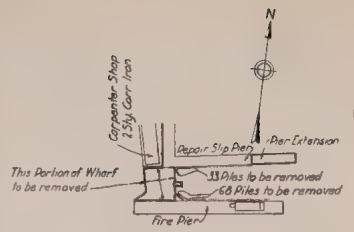
FIRE PIER



SECTION A-A



SECTION B-B

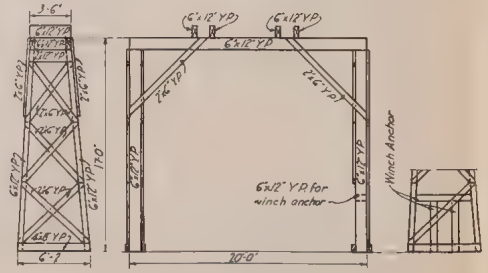


STRUCTURES TO BE REMOVED

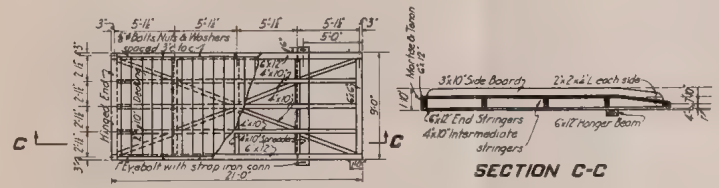
NOTES:-
For additional details of materials and workmanship see Contract Specifications.
Gallows Frame and Gang Plank bolts 8" dia. sq heads with nuts and two washers
Elsewhere, bolts 1" dia. sq. heads with nuts and two washers.

REFERENCES:
For Location see Dwg. No. 5.
For Index of Contract Plans, see Contract Dwg. No. 1.

GENERAL PLAN
WHARF RECONSTRUCTION



GALLOWS FRAME



PLAN

SECTION C-C

GANG PLANK
Y.P. Timber. Stringers one piece.

WHARF CHANGES
(Contractor's Area A-A, Richmond)

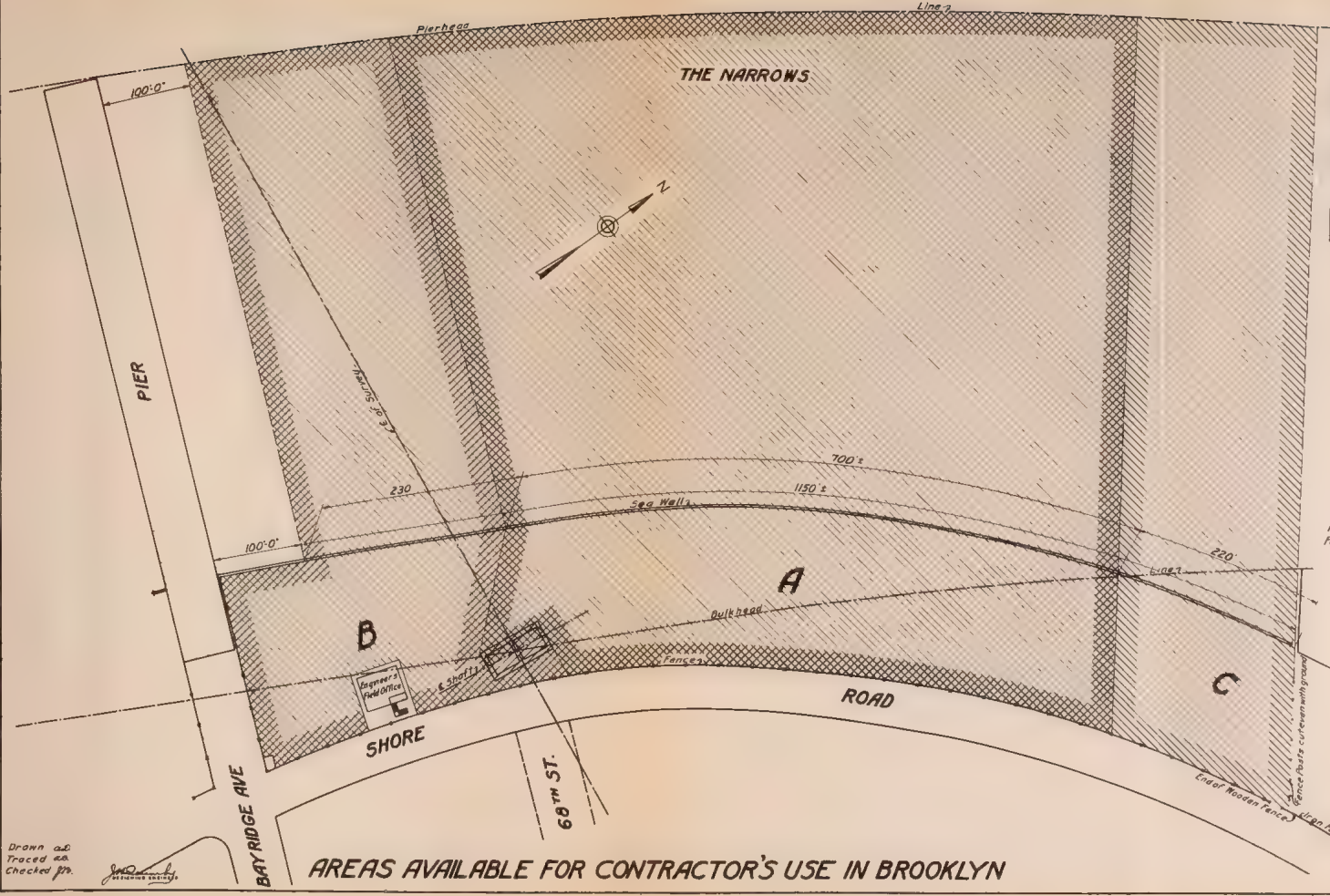
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

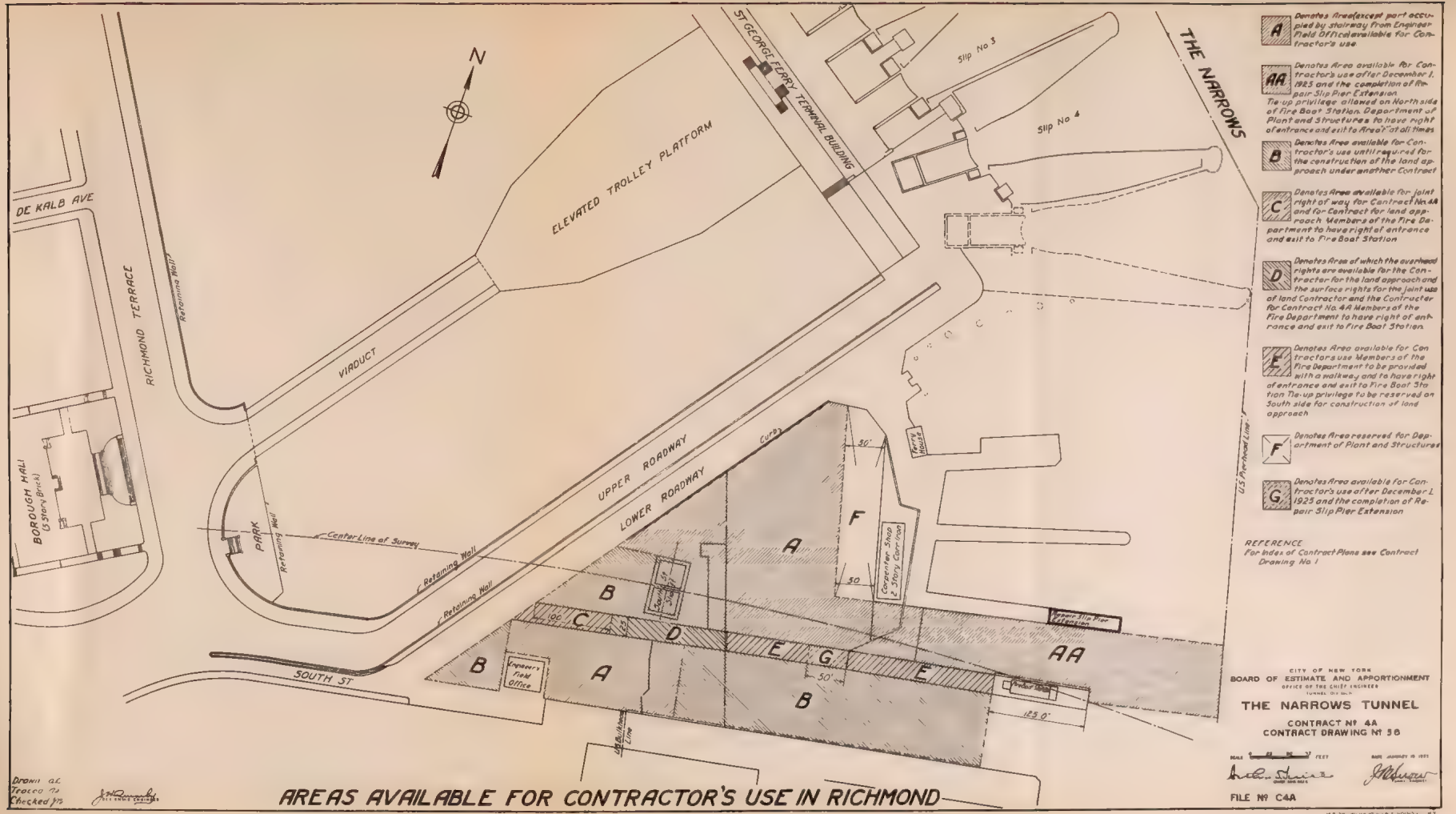
THE NARROWS TUNNEL

CONTRACT Nº 4 A
CONTRACT DRAWING Nº 56

FILE Nº C 4 A

M & B BROWN PRINT MFG & BINDERS CO. N.Y.


Line 2
Pierhead
THE NARROWS
100'-0"
PIER
Edge of Survey
230
700'±
1150'±
Sea Wall
100'-0"
220'
Line 1
A
B
C
Bulkhead
Fence
Engineer's Field Office
6 Shafts
ROAD
SHORE
BAY RIDGE AVE
68TH ST.
End of Wooden Fence
Face Posts cut even with ground
Iron Fence
N
A Denotes Area available for Contractor's use
B Denotes Area available for Contractor's use until required for construction of land approach under another contract.
C Denotes Area available for Contractor's use for this and other contracts as determined by Engineer
REFERENCE
For Index of Contract Plans, see Contract Drawing No.1
CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION
THE NARROWS TUNNEL
CONTRACT Nº 4A
CONTRACT DRAWING Nº 57
SCALE 0 30 60 FEET
DATE JANUARY 15, 1929
FILE Nº C4A
Drawn as
Traced as
Checked by.
AREAS AVAILABLE FOR CONTRACTOR'S USE IN BROOKLYN



A — Denotes Area except part occupied by stairway from Engineer Field Office available for Contractor's use

AA — Denotes Area available for Contractor's use after December 1, 1925 and the completion of Repair Slip Pier Extension. Tie-up privilege allowed on North side of Fire Boat Station. Department of Plant and Structures to have right of entrance and exit to Area "A" at all times

B — Denotes Area available for Contractor's use until required for the construction of the land approach under another Contract

C — Denotes Area available for joint right of way for Contract No. 4A and for Contract for land approach. Members of the Fire Department to have right of entrance and exit to Fire Boat Station

D — Denotes Area of which the overhead rights are available for the Contractor for the land approach and the surface rights for the joint use of land Contractor and the Contractor for Contract No. 4A. Members of the Fire Department to have right of entrance and exit to Fire Boat Station

E — Denotes Area available for Contractor's use. Members of the Fire Department to be provided with a walkway and to have right of entrance and exit to Fire Boat Station. Tie-up privilege to be reserved on South side for construction of land approach

F — Denotes Area reserved for Department of Plant and Structures

G — Denotes Area available for Contractor's use after December 1, 1925 and the completion of Repair Slip Pier Extension

REFERENCE
For Index of Contract Plans see Contract Drawing No 1

CITY OF NEW YORK
BOARD OF ESTIMATE AND APPORTIONMENT
OFFICE OF THE CHIEF ENGINEER
TUNNEL DIVISION

THE NARROWS TUNNEL

CONTRACT Nº 4A
CONTRACT DRAWING Nº 38

SCALE 1" = 100 FEET
DATE JANUARY 19 1925

FILE Nº C4A

Drawn at Tracing Checked by

AREAS AVAILABLE FOR CONTRACTOR'S USE IN RICHMOND

AVERY CLASSICS